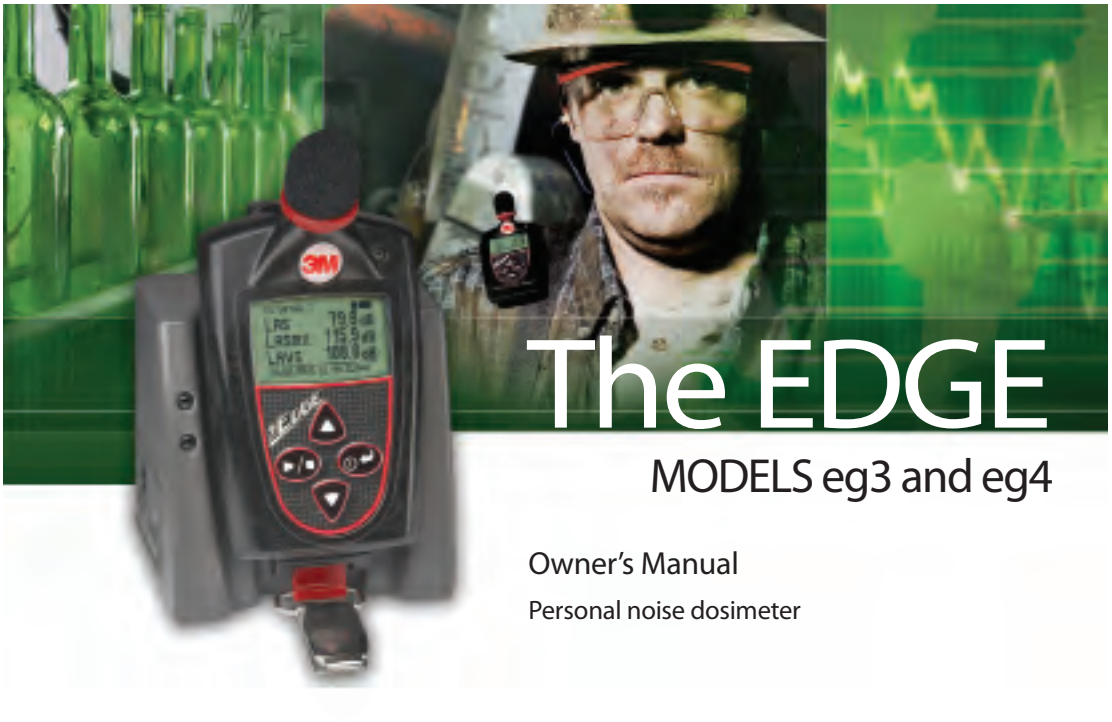
3M Occupational Health & Environmental Safety Division

3M™ The Edge eg3 and eg4 models



MODELS eg3 and eg4

Owner's Manual

Personal noise dosimeter

QUEST TECHNOLOGIES a 3M company

3M

EDGE Models eg3 and eg4

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Table of Contents

CHAPTER 1: INTRODUCTION 1

Dosimetry 1

Noise dosimeter 2

Range of sound 3

What do the standards say? 3

Applications of the Edge 4

Noise assessment steps 5

The Edge Models 5

Virtual dosimeters 6

CHAPTER 2: GETTING STARTED 7

Checking the equipment 7

Turning on 8

LED indicator 8

Navigating 9

Turning off 9

Display and keypad 10

Diagram 10

QuestSuite Professional II software 11

Loading 11

Docking station functionality 11

Docking station components 12

EdgeDock1 or EdgeDock5 12

Powering EdgeDock1 or EdgeDock5 13

Charging your dosimeter 14

Mounting the docking station to a wall 15

Storing the dosimeter 15

CHAPTER 3: SETTING-UP THE EDGE VIA QSP-II 17

Noise studies 17

Understanding what data is stored 18
Summary data 18

Time history 19

Views on the Edge 20

Definitions of data log values and views 20

Docking 23

Communicating & downloading data 23

Customizing set-up parameters in QSP-II 25

Dosimeter setting 25

Display setting: customizing your views 27

Auto On setting 28
Programming the Edge to auto start & stop a study 28

Security: setting secure/lock during your run 29

Clearing the dosimeter 33

Set Time setting 34

QSP-II: Updating Edge firmware 35

CHAPTER 4: RUNNING AND OPERATING YOUR DOSIMETER 37

Overview of running a study 37

Positioning the Edge on your shirt 38

Checking battery power 39

Calibrating 40

Resetting the dosimeter 41

Setting contrast on dosimeter 42

Running studies 43

Starting a run 43

Stopping a study 44
Indicators/Icons on the display 44
Viewing measurements on the display 45
Locking or securing your dosimeter during run 45
Locking or Securing 46
Unlocking 46
CHAPTER 5: VIEWING YOUR STUDIES IN QSP-II 47
Retrieving your studies into QSP-II 47
Where your studies are stored 49
Downloaded Node 49
Viewing your Edge data in QSP-II 50
Adding panels (charts/graphs) 53
Saving your customized layout (charts/graphs) 53
Creating reports 54
Viewing and printing reports 54
CHAPTER 6: TECHNICAL SUPPORT 55
LED indicator: disable/enable 55
Replacing microphone and windscreen 56
Attaching/Detaching 56
APPENDIX A: SPECIFICATIONS 58
Standards 58
Mechanical characteristics 58
Electrical characteristics 59
Battery 59
Environmental effects 59
Temperature 59

User Interface 59
Display 59
Keypad 59
EdgeDock1 and EdgeDock5 60
Physical attributes of EdgeDock1 and EdgeDock5 60
Measurements 61
Types 61
Measurement parameters 61
Communications 62
Special functions 62
Block Diagram 63
Quest Service 65
Contacting Quest Technologies 65
International customers 65
Warranty 66
APPENDIX B: GLOSSARY OF TERMS 68
INDEX 85

List of Figures

Figure 1-1: Sample measurement display 1
Figure 1-2: Illustration of how the dosimeter operates and processes 2
Figure 1-3: Parameter setup screen for eg4 6
Figure 2-1: Identifying your equipment 7
Figure 2-2: Powered on with measurement view displayed 8
Figure 2-3: Edge Keypad 10
Figure 2-4: EdgeDock1 11
Figure 2-5: Attaching the charger adapter with the plug adapter 12
Figure 2-6: Attaching charger adapter to EdgeDock1 13
Figure 2-7: Docking the Edge on the EdgeDock 14
Figure 2-8: Backside of EdgeDock1 15
Figure 3-1: Edge setup and retrieve data buttons 17
Figure 3-2: Sample summary data from QSP-II reporting 18
Figure 3-3: Sample time history data (or logged data) chart 19
Figure 3-4: Communicating - connecting a docked Edge to a pc 23

Figure 3-5: New Hardware wizard for Edge Dock 24
Figure 3-6: Setting-up Dosimeter parameters 26
Figure 3-7: Status update message in QSP-II 26
Figure 3-8: Changing the display via QSP-II 27
Figure 3-9: Setting the Edge to start automatically....29
Figure 3-10: Secure/Lock setting....30
Figure 3-11: Setting identity field 31
Figure 3-12: Identity screen 32
Figure 3-13: Clearing the dosimeter 33
Figure 3-14: Setting date and time in QSP-II 34
Figure 3-15: Updating Edge Firmware 35
Figure 4-1: Quick help list for running a study 37
Figure 4-2: Attaching the Edge on your shoulder 38
Figure 4-3: Battery indicators 39
Figure 4-4: Calibrating....40
Figure 4-5: Splash screen 41
Figure 4-6: Resetting the Edge from the keypad 41
Figure 4-7: Changing the contrast from the keypad 42
Figure 4-8: Display screen while running 43
Figure 4-9: Locking/Securing run 46
Figure 5-1: Communicating between your pc and the Edge 47
Figure 5-2: Retrieve Data screen in QSP-II 48
Figure 5-3: Viewing your studies from QSP-II 49
Figure 5-4: Downloaded studies....50
Figure 5-5: Viewing layout view (charts and graphs) in QSP-II....52
Figure 5-6: Saving a customized template of the layout view (charts/graphs) 53
Figure 5-7: Sample Edge Report in QSP-II....54
Figure 6-1: Microphone and windscreen assembly....56

List of Tables

Table 2-1: LED indicators explained 9
Table 2-2: EdgeDock1 and EdgeDock5 components 12
Table 3-1: Dosimeter views and definitions....20
Table 3-2: Dosimeter measurement descriptors/variants 22
Table 4-1: Indicators (i.e., run, stop, battery, and OL) 44
Table 5-1: Downloading data in QSP-II explained 51
Table 5-2: Explanation of panels (graphs and charts) components....52

CHAPTER

1

Introduction

Dosimetry

Measuring noise in the workplace is an important element of hearing conservation programs and noise reduction programs. With a noise dosimeter, you can assess and determine a worker's daily exposure to noise levels. This information can be used to ensure compliance with regulatory bodies or to ensure if hearing conservation programs are needed.

To get you started quickly with the Edge, the first chapter is dedicated to introducing basic noise dosimetry terms and information. The subsequent chapters will guide you through setting up the dosimeter, running studies, and assessing your results with easy to follow steps and illustrations.

Figure 1-1: Sample measurement display

Noise dosimeter

What is a noise dosimeter and how does it compute measurements? Essentially, a noise dosimeter is composed of the following: a microphone with a preamplifier, a weighted network, fast or slow response time, an internal clock, calculator, and memory to store logged data.

The illustration below is a diagram of a basic noise dosimeter. The microphone will, when exposed to a sound pressure, generate an electrical signal. The signal will be increased by a preamplifier, and then is regulated to an applicable level by the range control (dB range). The signal then goes through a filter set or weighting system. The next circuit is the response circuit, which controls the dampening of the readout. The response choices are typically Slow or Fast. Finally, the results will display on the dosimeter screen.

For computation and storage, the clock tracks the sampling time. Dosimeters record how long sound levels exceeded a set upper limit. The calculator computes an L-avg, a dose, a TWA, and other data. The memory stores all times, calculations, and measurements.

For post-processing, QSP-II is used to view and analyze your measurement results with the option to view and/or print reports.

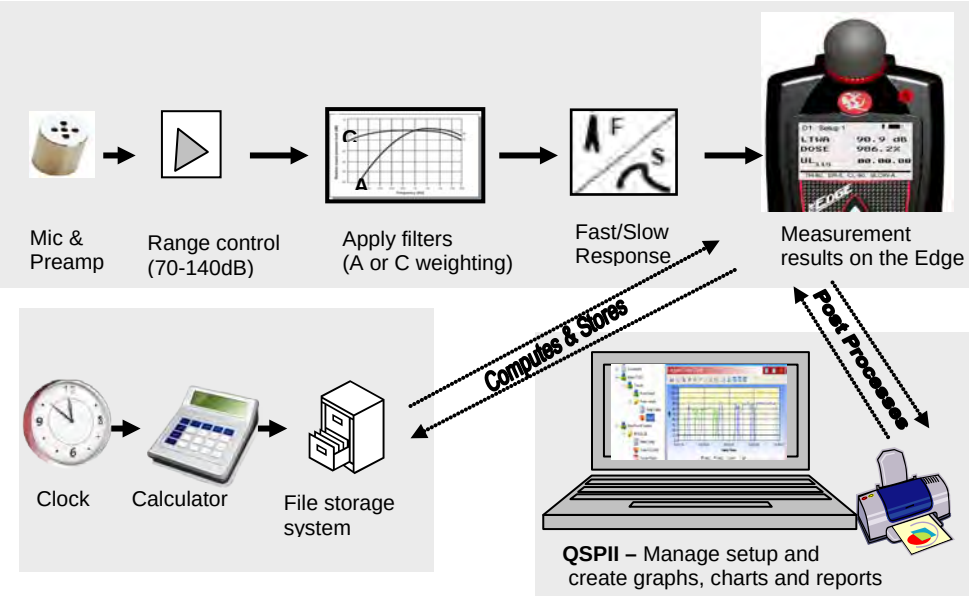


Figure 1-2: Illustration of how the dosimeter operates and processes

Range of sound

Sound pressure is measured in decibels, or tenths of a Bel. Sound pressure level is indicated as dB SPL. Since the human ear can detect sounds with an extensive range of amplitude, a decibel scale is used to simplify the measurement results. For example, the ratio between the threshold of hearing and threshold of pain in the human ear if measured in true energy is 10,000,000 times! The same range using the dB scale is 0 - 140 dB referenced to 20 µPa (Micropascals).

The quietest sound that humans can hear has an amplitude of approximately 0 dB. Prolonged exposure to sound pressure levels exceeding 85 dB can cause permanent damage to the ear. Sound levels in excess of 130 dB are more than the human ear can safely withstand and can result in serious pain and permanent damage.

What do the standards say?

Many organizations have studied and analyzed the effects of high sound exposure on hearing. As a result, standards were developed to regulate personal noise exposure. In the United States, the Occupational Safety and Health Administration (OSHA), the Mine and Safety and Health Administration (MSHA), and the American Conference of Governmental Industrial Hygienists (ACGIH) have all created regulations and limitations on total permissible noise exposure. International standards are specified by the health and safety regulations such as the European Union (EU) Directive 2003/10/EC. Additionally, the International Electrotechnical Commission (IEC) IEC-61252 has specific guidelines and regulations to monitor noise in the workplace.

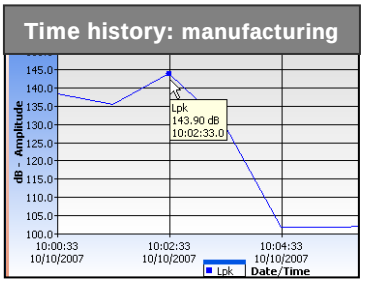
To access these copyrighted standards, please refer to the following:

- ☑ OSHA - http://www.osha.gov
- ☑ MSHA- http://www.msha.gov
- ☑ NIOSH - http://www.cdc.gov/niosh/topics/noise
- ☑ ACGIH - http://www.cdc.gov/niosh/topics/noise
- ☑ IEC - http://www.iec.ch

Applications of the Edge

The Edge has a cable-free, mounted microphone that converts sound pressure into an electrical signal. This signal is conditioned, monitored, and integrated over time in order to provide a host of automatically calculated values that can be used in occupational and environmental noise assessments. Programmable parameters permit the Edge to serve many applications. The Edge can be used in the following applications:

☑ **As a personal noise dosimeter -** Used to measure a worker's daily exposure to noise levels. This information can be used to ensure compliance with OSHA, MSHA, ACGIH, IEC, or your own customized parameter settings to determine if your workers are over-exposed to noise.

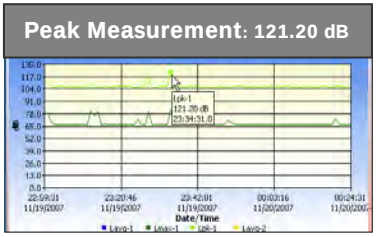


☑ **As a time-history monitor-** Used to provide a worker's minute-by-minute noise exposure levels. This data can help you identify major contributors to the average daily noise exposure.

☑ **As a survey monitor**

1. **Throughout a plant/facility –** used to oversee noise levels throughout an entire facility. You can identify machines and equipment which produce harmful noise levels.

2. **Specific areas in a plant/facility-** used to identify key areas as "noisy" and implement noise control options. Employees may be exposed to unacceptable noise levels.



☑ **As a peak dosimeter-** Used to detect the highest level of instantaneous sound pressure.

Noise assessment steps

1. **Perform a task-based work flow analysis of unacceptable "noisy" areas and list regulations/codes you will follow.**
   - Observe facility/areas and jot down areas of concern
   - Check with standards and noise ordinance regulations in your region/city.
     - ***See Chapter 1*** for basic information on dosimetry and standards

↓

2. **Setting-up your dosimeter parameters for your noise studies.**
   - Customize measurement setup (i.e., criterion level, threshold, weighting, exchange rate, etc.)
     - ***See chapter 2*** for getting started with your dosimeter
     - ***See Chapter 3*** for customizing your set-up parameters
     - ***See Chapter 6*** for Noise study scenarios

↓

3. **Running your studies.**
   - Calibrate dosimeter
   - Attach the dosimeter
   - Run, observe, and stop your studies
   - Understand display indicators
     - ***See Chapter 4*** "Running and operating the Edge"

↓

4. **View your results via QSP-II.**
   - Working with Charts and Graphs
   - Organizing and saving your studies
     - ***See Chapter 5*** to view measurements with QuestSuite Professional II

↓

5. **Develop corrective actions.**
   - Engineering: redesign tools, implement changes in workstation
   - Administrative: job sharing/rotations, redefinition of job functions, reduce duration operating tool/equipment, and/or implement medical surveillance

The Edge Models

Quest Technologies offers two Edge models. The “eg4” model features two virtual dosimeters with data logging. Once the parameters are set and saved in the dosimeter, you can monitor two different dosimeters by a single press of the Enter button. This will toggle you between the two dosimeters. The “eg3” model is equipped with one dosimeter setting and will not data log.

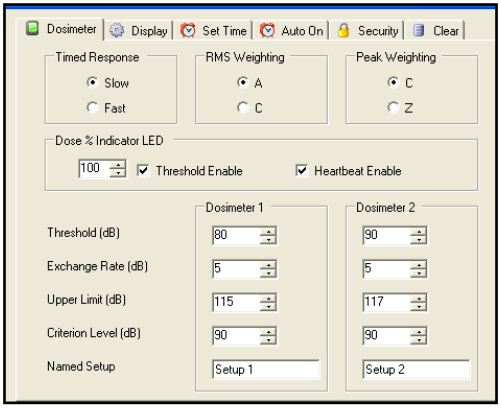


Figure 1-3: Parameter setup screen for eg4

Virtual dosimeters

You can monitor and log noise studies by enabling two different parameter settings in one dosimeter, also referred to as “virtual dosimeters”. For instance, you may want to set one dosimeter to log using the OSHA HC (Occupational Safety and Health Administration - Hearing Conversation) parameters and also monitor noise with the OSHA PEL (Occupational Safety and Health Administration – Permissible Exposure Level) settings.

A few scenarios of virtual dosimeters include:

- ☑ Industrial noise control
- ☑ Hearing conservation compliance
- ☑ Work site assessments
- ☑ Personal noise verification
- ☑ Military applications
- ☑ Regulatory compliance (i.e., OSHA, MSHA, IEC, ACGIH)

Getting started

This chapter is designed to guide you through basic information you will need to begin logging your studies.

Checking the equipment

If your instrument was sent to you in a storage case, you will want to remove all the packaging and acquaint yourself with the following equipment so you can quickly get started with your noise studies.

- ***NOTE:*** *Depending on the accessories you selected, the dosimeter may have the following components. For the docking stations, you will either have an EdgeDock1 or an EdgeDock5. (For more information on parts/accessories, please refer to www.questtechnologies.com.)*

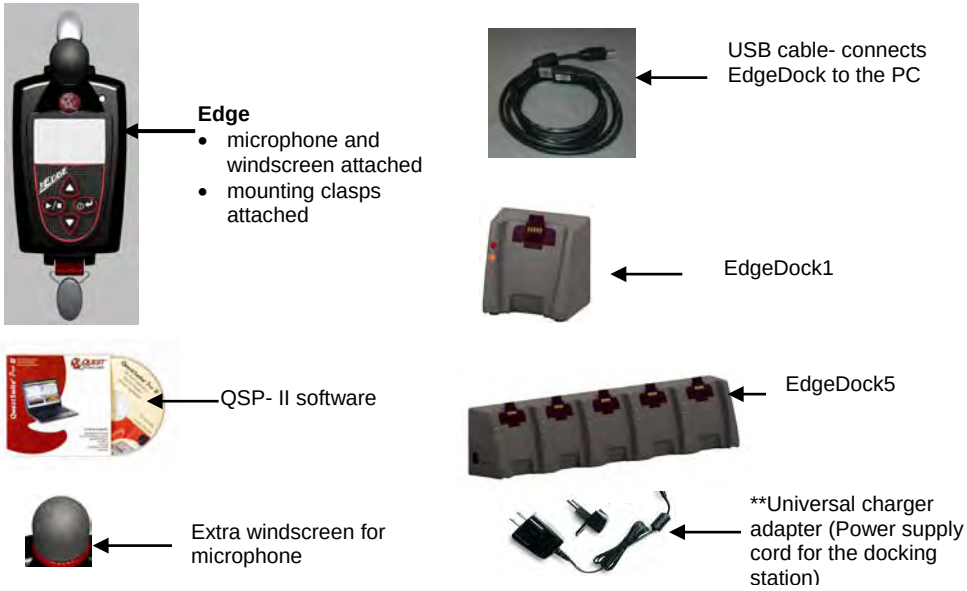

Edge
• microphone and windscreen attached
• mounting clasps attached
USB cable- connects EdgeDock to the PC
EdgeDock1
QSP- II software
EdgeDock5
Extra windscreen for microphone
**Universal charger adapter (Power supply cord for the docking station)

Figure 2-1: Identifying your equipment

Turning on

1. To turn on the Edge, press the **on/off** and **enter** button.
   - ☑ The Edge **splash screen** (see Figure 2-3 for an example, page 10) will appear indicating the model (i.e. “eg4” or “eg3”) and firmware version. The screen will be in the **measurement view**.

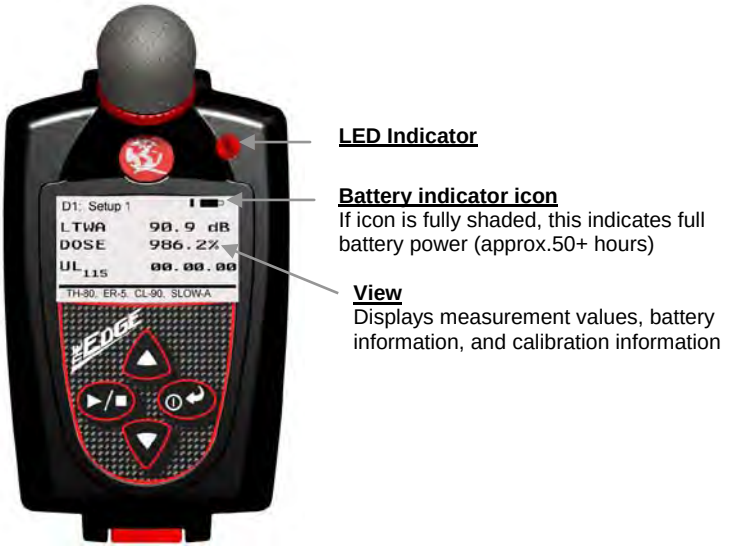


Figure 2-2: Powered on with measurement view displayed

LED indicator

There is a three-color LED indicator on the Edge, located to the right of the Quest globe.

Table 2-1 explains when and why the LED indicator color will appear.

NOTE: *The LED indicator can be disabled via QSP-II (see section, "Explanation of setting LED in QSP-II", page 25).*

LED indicator	Explanation
Red	A flashing red LED indicates the dose has exceeded the alarm level.
Amber	A flashing amber LED indicates the dosimeter is stopped and has not exceeded the dose alarm level.
Green	A flashing green LED indicates the dosimeter is running and has not exceeded the dose alarm level.

Table 2-1: LED indicators explained

Navigating

Once the dosimeter is "Powered-On", press the **up/down** ▲/▼ arrows to navigate through the measurement values and battery run time.

Turning off

1. Press and hold the **on/off and enter** button.
   ☑ "3, 2, and 1" countdown will appear as the dosimeter is powered off.

☑ ***NOTE:*** *To halt the power off mode, simply let go of the* ***on/off enter*** *button.*

Display and keypad

The keypad is used to run and stop your studies, view your measurement values, and power on and off the dosimeter.

Diagram

The following diagram explains the features on the display and keypad.

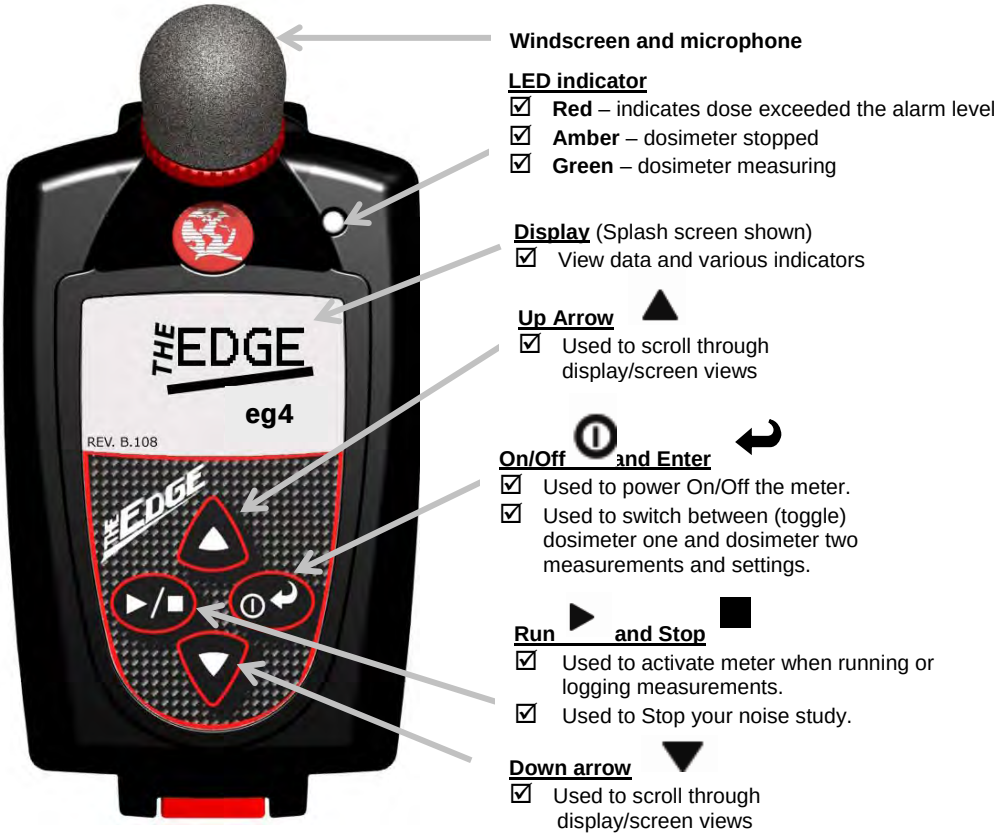

Windscreen and microphone
LED indicator
☑ Red – indicates dose exceeded the alarm level
☑ Amber – dosimeter stopped
☑ Green – dosimeter measuring
Display (Splash screen shown)
☑ View data and various indicators
Up Arrow
☑ Used to scroll through display/screen views
On/Off and Enter
☑ Used to power On/Off the meter.
☑ Used to switch between (toggle) dosimeter one and dosimeter two measurements and settings.
Run and Stop
☑ Used to activate meter when running or logging measurements.
☑ Used to Stop your noise study.
Down arrow
☑ Used to scroll through display/screen views
THE EDGE
eg4
REV. B.108

Figure 2-3: Edge Keypad

QuestSuite Professional II software

QuestSuite Professional II (QSP-II) is a software application designed by Quest Technologies that runs under the Windows operating system. You can use QSP-II for a variety of functions related to the Edge dosimeter and with many other Quest instruments. QSP-II has the ability to customize your set-up parameters, display data, manipulate data, and create reports.

Loading

***To load QSP-II software*, ** follow the instructions on the back of the CD.

It will automatically load the drivers for the EdgeDock1 and/or EdgeDock5. If loading from Quest Technologies Internet site, please follow the directions online. (http://questtechnologies.com/)

Docking station functionality

Depending on the kit you purchased, you may have an EdgeDock1 and/or an EdgeDock5. Both are designed similarly with the same LED indicators. The main difference with the EdgeDock5 is that it has five bays for docking, charging, and/or managing the dosimeters. If desired, the EdgeDock5 will charge all docked instruments at one time.

The docking station serves a ***dual-purpose role***:

(1) It is used to charge the battery on the dosimeter(s).
(2) It is used to communicate between the software (QSP-II) and the dosimeter (i.e., import, export settings and measurement files).

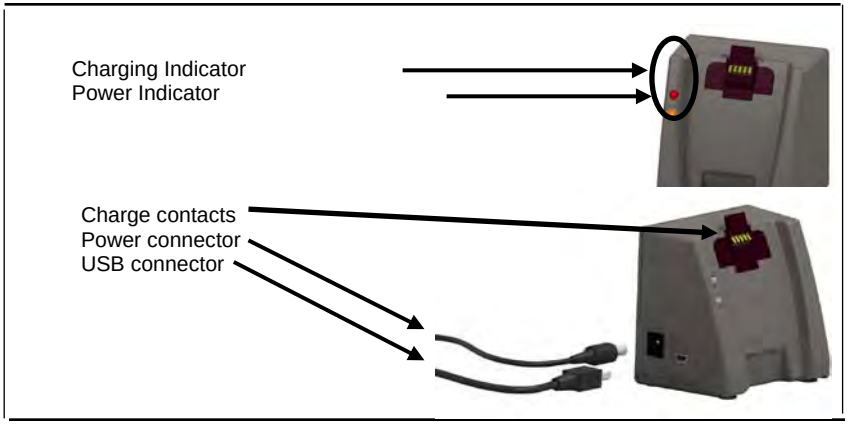


Figure 2-4: EdgeDock1

Docking station components

The table below explains the EdgeDock1 or EdgeDock5 LED indicators, power connector, USB connector, and contact pins.

Docking station components	Explanation
Charging indicator	Identifies if the dosimeter is “charging” or “fully charged”. A red blinking LED indicates the dosimeter is charging. A solid green LED equates to a fully charged dosimeter.
Power indicator	An amber LED indicates the docking station is powered on.
Power connector	Attach the power connector cable to the docking station in order to charge the dosimeter(s).
USB connector	Attach the USB connector to communicate with the dosimeter(s).
Charge Contacts	Placing the dosimeter (s) onto the charge contacts allows charging and communication.

Table 2-2: EdgeDock1 and EdgeDock5 components

EdgeDock1 or EdgeDock5

The EdgeDock1 and EdgeDock5 are powered by a 12-volt charger adapter.

Figure 2-5 illustrates the assembly of the charger adapter and the plug adapter. It slides into place by guiding it down the back cavity (opening) of the power supply.

☑ ***NOTE:*** *the example is a typical adapter which may be different than the one you are using. Mechanically, it will function similarly.*

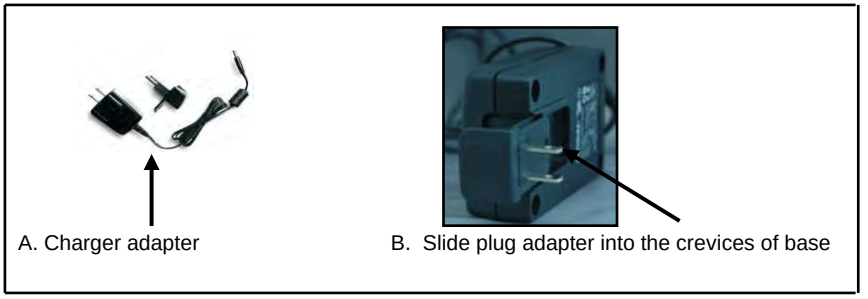


Figure 2-5: Attaching the charger adapter with the plug adapter

Powering EdgeDock1 or EdgeDock5

➢ **Powering EdgeDock1 or EdgeDock5**

1. Assemble the charger adapter and plug adapter as illustrated in Figure 2-5. (It will be the same process for an EdgeDock5.)
2. Plug the charger adapter directly into the wall (electrical wall plate).
3. Plug the opposite end into the power connector (or jack) of the EdgeDock1.

☑ ***NOTE:*** *an amber, solid light will appear indicating power to the charger.*

Figure 2-6: Attaching charger adapter to EdgeDock1

Charging your dosimeter

The number of hours you have used your dosimeter from your last charge will impact your total charge time. For example, if the battery clock indicator (see "Checking the battery power" for more information) displays 20 hours remaining on the battery and you wish to charge the battery, the approximate charging time is 2 hours.

☑ ***NOTE:*** *To charge a fully discharged battery, it would take approximately 4 to 4.5 hours.*

➢ **How to charge**

1. Plug in the power adapter to the EdgeDock. (See Figure 2-6, page 13.)
   ☑ When powered on, the EdgeDock bottom LED indicator will appear solid amber.
2. Slide the Edge (1) downward onto the **Hook** of the EdgeDock. (See Figure 2-7 below).

- ***NOTE:*** *When the dosimeter is docked, the top LED indicator on the base will be illuminated. A red flashing LED indicates it is charging. A green solid LED indicates a fully charged battery.*

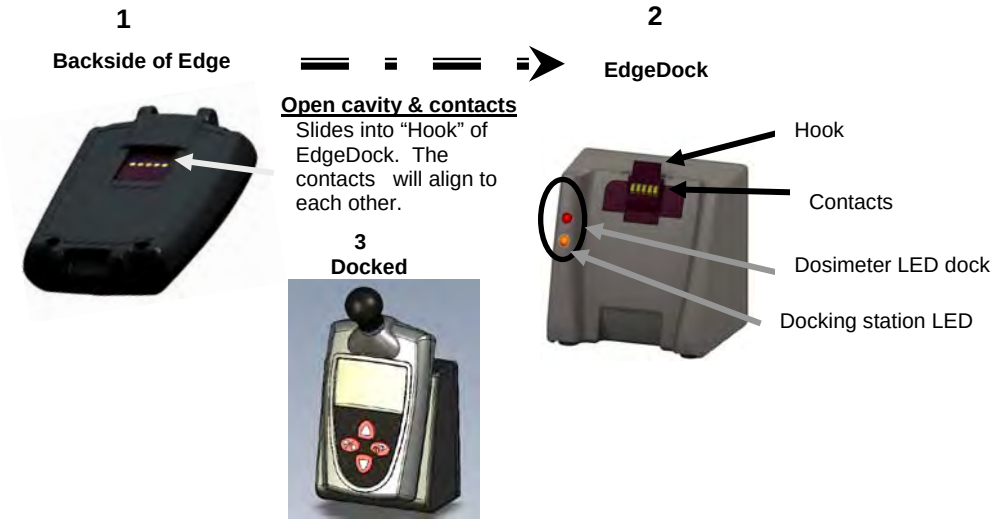


Figure 2-7: Docking the Edge on the EdgeDock

Mounting the docking station to a wall

The docking station is equipped with two single screw slots in case you wish to mount the docking station to the wall. The figure below displays the backside of the single bay dock.

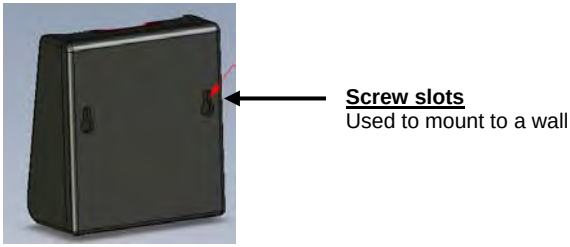


Figure 2-8: Backside of EdgeDock1

Storing the dosimeter

To preserve the life of the battery, it is suggested that the dosimeter is turned off when you are storing the dosimeter.

Additionally, if the dosimeter is docked and stored on the docking station when it is powered off, it will still draw a small amount of battery power from the dosimeter. Thus, it is recommended to store the dosimeter(s) separately from the docking station.

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CHAPTER

3

Setting-up the Edge via QSP-II

Noise studies

The eg4 model comes equipped with two customizable user setups. The eg3 model has one customizable user setup. You have the option to customize the parameters for threshold values, exchange rate values, an upper limit value, and a criterion level.

This chapter explains data storage, the pre-set views on the dosimeter, and explains how to customize the parameters and display of your Edge via QSP-II. It concludes with an explanation of retrieving data from your dosimeter to the software.

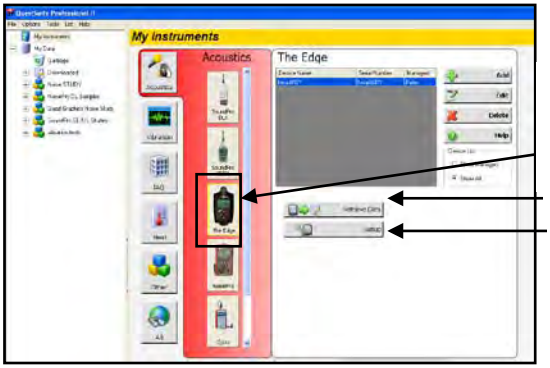


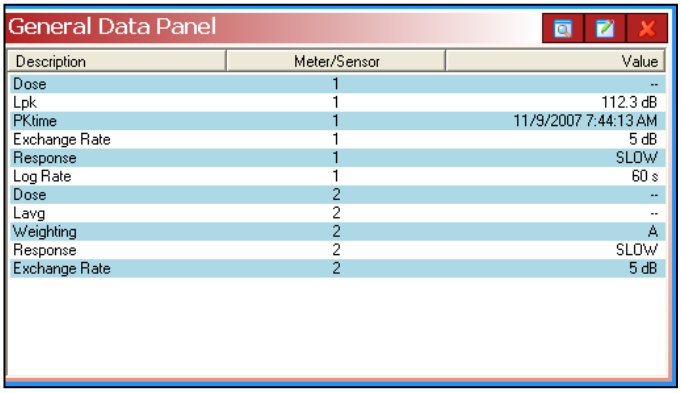
Figure 3-1: Edge setup and retrieve data buttons in QSP-II

Understanding what data is stored

When you are running noise dosimetry studies, there are two types of data stored on the dosimeter. These two types of data are: Summary data and Time History (or Logged) data.

Summary data

Summary data represents values that occurred over the entire run of the study. For an average value, such as Lavg, it represents the average decibel value over the entire run time. Peak and Max values are the highest measurements that occurred throughout the run time.



Description	Meter/Sensor	Value
Dose	1	--
Lpk	1	112.3 dB
PKtime	1	11/9/2007 7:44:13 AM
Exchange Rate	1	5 dB
Response	1	SLOW
Log Rate	1	60 s
Dose	2	--
Lavg	2	--
Weighting	2	A
Response	2	SLOW
Exchange Rate	2	5 dB

Figure 3-2: Sample summary data from QSP-II reporting

Time history

Time history data is also referred as “logged data” which plots measurement values in minute by minute intervals.

Time History data represents values that occurred over the most recent time period, which is the logging interval. For example, if the log interval is 1 minute, then the Peak value is the highest Peak value for that 1 minute, and the Lavg value is the average dB value for that 1 minute.

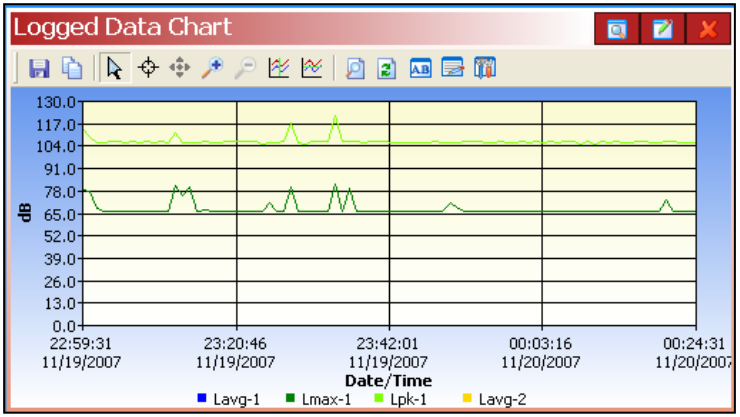


Figure 3-3: Sample time history data (or logged data) chart

Logging

eg4 model only logs at one minute intervals and includes the following measurements:

- Meter 1 logs L_{avg}/L_{eq}
- Meter 2 logs L_{avg}/L_{eq}
- L_{pk} and L_{max}

If the dosimeter runs for one hour, then it will log 60 Lavg/Leq results, and 60 Lmax/Lpk levels. In QSP-II, you can customize the logged data chart results by checking Lavg/Leq, Lpk, and/or Lmax measurement values.

Views on the Edge

The Edge is a user-friendly and customizable dosimeter. With a simple click of a checkbox in QSP-II, you can select the appropriate measurement values or views to appear or not appear on the display of your dosimeter. The following table briefly identifies the displayed data values and views with a brief definition. (See the glossary for additional information of these terms.)

Definitions of data log values and views

To set up the Edge and work with noise-level data, you will want to have a good understanding of the terms listed in Table 3-1.

☑ ***NOTE:*** *The following table is based on A-weighted, slow measurements. Thus, if you choose A or C-weighted with Fast or Slow response the measurement values will change on the display (i.e., you selected sound pressure level with C-weighting with Fast response, it will display as L_{CF}.) For further details, please see Table 3-2.*

Views on the EDGE	Explanation
L_{AS}	***Sound pressure level -*** is the basic measure of noise loudness, expressed in decibels. (In QSP-II this is noted as "SPL")
L_{ASMX}	***Maximum sound level*** - is the highest sound level recorded during a measurement interval with a particular response setting (Slow or Fast) and weighting (A or C). LMax is the highest value that is included in LAvg or dose calculations. • Under OSHA regulations, unprotected workers may not be exposed to maximum sound levels greater than 115dB, measured with a Slow response rate.
L_{CPK}	***Peak Level*** - is the highest instantaneous sound pressure level recorded during a measurement interval. Unlike the maximum level, the peak is detected independently of dosimeter settings for response rate or weighting. • Under OSHA regulations, unprotected workers may not be exposed to peak sound levels greater than 140dB.
L_{ASMN}	***Minimum sound level*** - The lowest sampled sound level during the measurement interval allowing for the unit's Response Time setting (Fast or Slow).
L_{AVG}	***Average sound level -*** (in dB) computed for a chosen time duration, based on a 4, 5, or 6dB exchange rate. L_{AVG} with a 3dB exchange rate is referred to as LEQ (equivalent sound level). All sound levels at or above the threshold level are averaged into the calculations relating to noise exposure. L_{AVG} is typically calculated with no threshold, with a threshold of 80dB or with a threshold of 90dB.

Table 3-1: Dosimeter views and definitions

Views on the Edge	Explanation
L_{TWA}	***Time-weighted average*** - is the sound level (in dB) that is accumulated for any time period but with its average level computed over an 8-hour period. TWA is usually measured with A-weighting, Slow response, and a 5dB exchange rate. • All sound levels at or above the threshold level (cutoff level) are averaged into the calculations relating to noise exposure. TWA is calculated with no cutoff, with cutoff 1 (typically 80db), or with cutoff 2 (typically 90db). • If the time period is less than 8 hours, the TWA will be less than the LAvg. If the time period is more than 8 hours, the TWA will be more than the LAvg.
L_{AE}	***Sound Exposure Level (SEL)* –** The sound exposure level averages the sampled sound over a one second period. Assuming the sampled run time to be greater than one second, SEL is the equivalent one-second noise that would be equal in energy to the noise that was sampled. SEL is typically measured using a 3dB exchange rate without a threshold. (L_{AE} is not used by OSHA.)
Dose	***Dose*** - Related to the Criterion Level, a dose reading of 100% is the maximum allowable exposure to accumulated noise. For OSHA, 100% dose occurs for an average sound level of 90 dB over an 8 hour period (or any equivalent exposure). (Please see Glossary of Terms for more details, page 70).
UL	***Upper Limit -*** is the amount of time that the sound level exceeds a preset level (the Upper Limit).
Response Level (Fast, Slow)	Typically, noise is not constant. Using a response of Slow or Fast simply smoothes the noise fluctuation and makes the sound level easier to work with. • **Slow** – 1 second (1,000 milliseconds, or msec) • **Fast** – 0.125 second (125 milliseconds)
RT	**Run Time -** The overall time of your noise study.
Weighting (A, C)	A and C weighting are types of frequency filters that cover the frequency range of human hearing (20Hz to 20 kHz). • **"A" weighting** - The "A" weighted filter attempts to make the dosimeter respond closer to the way the human ear hears. It attenuates the frequencies below several hundred hertz as well as the high frequencies above six thousand hertz. "A" weighted measurements are often reported as dBA. • **"C" weighting** provides a fairly flat frequency response with only slight attenuation of the very high and very low frequencies. "C" weighting is intended to represent how the ear perceives sound at high decibel levels and is often used as a "flat" response when LINEAR is not available. "C" weighted measurements are often reported as dBC.

Table 3-1: Dosimeter parameters and definitions (continued)

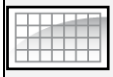
Views on the Edge	Explanation
	Memory storage symbol – • **eg4:** The eg4 model displays the total memory storage remaining in hours and minutes. For example, if it displays the memory symbol 181:50 this represents 181 hours and 50 minutes of memory storage remaining on the dosimeter. • **eg3**: The eg3 model displays the memory by indicating the remaining number of studies it will store into memory. For example, if the eg3 displays "50" this indicates you can store 50 studies on the dosimeter. (***Note:*** *the difference is because the eg3 model does not data log.*)
	***Calendar symbol–*** The calendar symbol and calendar field displays the day-month-year
	Battery power clock symbol – The battery power clock symbol identifies the number of hours and minutes of battery time remaining on the dosimeter.

Table 3-1: Dosimeter parameters and definitions (continued)

Edge Measurement descriptors/variants

The following is an explanation of the Edge descriptors and equivalents for Lmax, Lmin, & Lpk.

Descriptors	Variants
Lmax variants	***Sound pressure level -*** is the basic measure of noise loudness, expressed in decibels. (In QSP-II this is noted as "SPL")
L_{ASMX}	***Maximum sound level***- is the highest sound level recorded during a measurement interval with a particular response setting (Slow or Fast) and weighting (A or C). LMax is the highest value that is included in LAvg or dose calculations. • Under OSHA regulations, unprotected workers may not be exposed to maximum sound levels greater than 115dB, measured with a Slow response rate.
L_{CPK}	***Peak Level*** - is the highest instantaneous sound pressure level recorded during a measurement interval. Unlike the maximum level, the peak is detected independently of dosimeter settings for response rate or weighting. • Under OSHA regulations, unprotected workers may not be exposed to peak sound levels greater than 140dB.
L_{ASMN}	***Minimum sound level*** - The lowest sampled sound level during the measurement interval allowing for the unit's Response Time setting (Fast or Slow).

Table 3-2: Dosimeter measurement descriptors/variants

Docking

Communicating & downloading data

By using your docking station, USB cable, software, and your dosimeter, you can quickly communicate between the software and the dosimeter. There are two methods for communicating which are:

- **Send setup data**: Enables you to configure your set-up parameters in QuestSuite Professional II (QSP-II) and download these parameters to the Edge.
- **Retrieve data**: you have the capability to retrieve the data from the dosimeter into QSP-II in order to view and analyze your studies in QSP-II's charts, graphs, and reporting functionality.

➢ **How to connect your dosimeter to the computer**

1. Dock the dosimeter on the EdgeDock1 (or 5) and turn on the dosimeter by pressing the **on/off enter** button.

   ☑ ***NOTE:*** *See charging your dosimeter, on page 14.*

2. Plug the USB cable into the computer. (See "A" in Figure 3-4).
3. Plug the opposite end into the docking station (See "B" and "C").

   ☑ ***NOTE:*** *The docking station will be powered through the computer; thus, you do not need to plug in the charger adapter. If you wish to charge the dosimeter, plug in the charger adapter.*

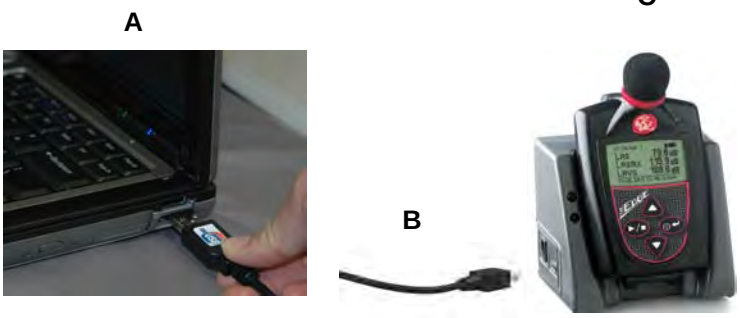


Figure 3-4: Communicating - connecting a docked Edge to a pc

4. For first time use of a docking station, **Welcome to the found new hardware wizard** will appear (see Figure 2-8). Select **No** and press **Next** through the remaining wizard. At the end of the wizard, press **Finish**.

   - This will install the hardware components associated with your EdgeDock1 and/or EdgeDock5.

   ☑ ***NOTE:*** *If you have more than one EdgeDock1 or EdgeDock5, this wizard will appear for each new dock which is connected to your pc.*

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
Back
Next >
Cancel

Figure 3-5: New Hardware wizard for Edge Dock

Customizing set-up parameters in QSP-II

Customizing and saving set-ups are performed via QSP-II. The following sections discuss each of the setup screens and explain how to save and send the parameters to the dosimeter(s).

Dosimeter setting

The dosimeter setting in QSP-II is used to define your setup parameters.

➢ **Customizing dosimeter tab**

1. **Dock** the Edge and plug in a USB cable to the pc. **Turn on** the Edge.

   ☑ ***NOTE:*** *if using multiple dosimeters, dock each one and either customize all at once or customize one by one as discussed in steps 2-6.*

2. From the welcome screen of QSP-II, select the **Edge** and click on **Setup button**

(see Figure 3-1, page 17).
3. Click on **Configuration** tab and then **Dosimeter** tab.
4. In the dosimeter screen, click in **Select All** checkbox (if using only one dosimeter).
   - Or **Expand** the **Edge Charging station** by clicking on the **+** and click on the appropriate dosimeter (s).
5. To set dosimeter settings, click in the **checkbox** or select the up/down **arrow box**. See Figure 3-6 for the following:
   - Fast or slow response **(A)**
   - A or C RMS weighting **(B)**
   - C or Z peak weighting **(C)**
6. To enable/disable the **LED indicators** refer to the following:
   - If "**Alarm enable"** is checked for the **Dose %**, then the dosimeter LED will flash red when the dose value exceeds the designated dose value entered.
   - If "**Heartbeat enable"** is checked, the Edge will flash green while running and flash red when stopped. (If unchecked, a green and red LED will not flash.)

   ☑ ***NOTE:*** *To conserve on battery power, these items may be disabled.*

7. To change dosimeter 1 or dosimeter 2, click on **up/down** arrows (see **F** and **G** in Figure 3-6). You have the following parameters:
   - **Threshold**: to disable uncheck the Threshold check box. To enable, ensure the checkbox is selected and a value is assigned (i.e., 80 dB).
   - **ER, UL, CL** are selectable via up/down arrows.
   - **Named setup**: type in a customized setup name (i.e. OSHA setting).
8. To change other settings, see next sections (setting display, set-up, auto on, security, or clear).

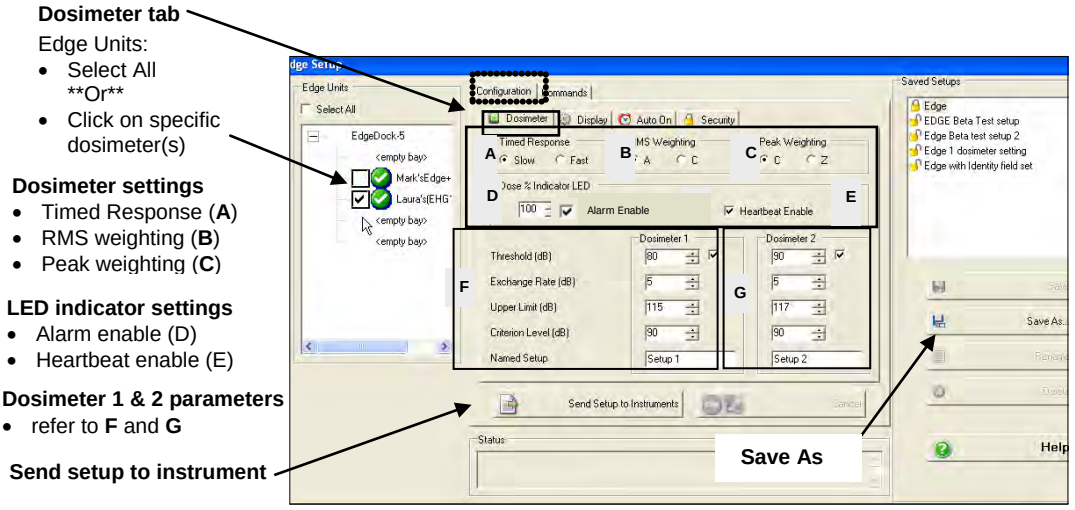


Figure 3-6: Setting-up Dosimeter parameters

9 Or click **Save As** to save the new set-up, assign a name, and click **Ok**.

10. Then, click on **Send Setup to Instrument** button.
    a. The status field will update stating it transferred and "complete!" (A sample status message is displayed below.)

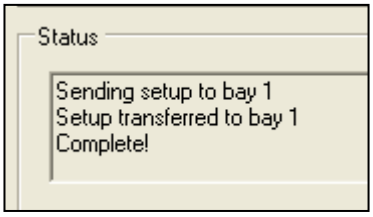


Figure 3-7: Status update message in QSP-II

Display setting: customizing your views

In the display screen of QSP-II, you can customize the Edge display. *For example, if you only want SPL, Peak, and RT to appear on the dosimeter, you would select these in the first three rows and then select "OFF" for all other rows.*

➢ Customizing display tab

1. **Dock** the Edge and plug in a USB cable to the pc. **Turn on** the Edge.
   ☑ Ensure the Edge is powered on by pressing the **on/off enter** button.
2. From the welcome screen of QSP-II, select the **Edge** and click on the **Setup** tab (see Figure 3-1, page 17).
3. Click on **Configuration** tab and then click on **Display** tab.
4. Click on the **Select All** button under Edge Units (if using one dosimeter). **Or** select by expanding the Edge Docking Station and click a **specific dosimeter** (s).
5. To change, click on one of the fields in the **item to display column.**
6. Under "set selected item", select from the drop down list.

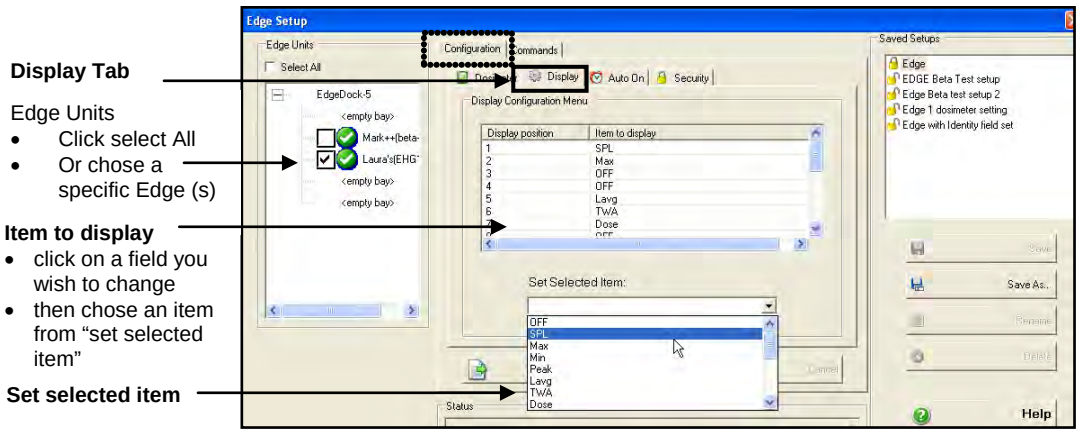


Figure 3-8: Changing the display via QSP-II

7. To change other settings, see next sections (setting display, set-up, auto on, security, or clear). Or click **Save As** to save the new set-up and name the settings.
   ☑ Alternatively, click **Save** to change the Edge setup under "**Saved Setup**". Then, click **Send setup to Instrument**.

Auto On setting

Programming the Edge to auto start & stop a study

You may want to set-up a study a day, a week, a month, or several months ahead of time. With the "Auto on" setting, you can pre-program one study based on the length of your study (or duration), start date, and start time. After setting this feature, ensure the Edge is turned off. (See turning off on page 9.)

➢ **Auto On setting**

1. Ensure the Edge is **turned on**, **docked**, and the **USB cable** is **connected** from the pc to the EdgeDock.
2. From the welcome screen of QSP-II, select the **Edge** and click on the **Setup tab** (see Figure 3-1, page 17).
3. Next, click on **Configuration** tab and then click the **Auto On** tab.
4. Under Edge units, click the **Select All** button (if using one dosimeter). Or select by expanding the Edge Docking Station and click the appropriate dosimeter(s) (if using the EdgeDock5).
5. To enable Auto-On 1 and/or Auto-On 2, click on the **Date** button.
6. Set the **duration**, **start date** and **start time** by clicking on the up/down arrows.

7. To finish, click Save to change the Edge setup under **Saved Setup**. Then, click **Send setup to Instrument**.

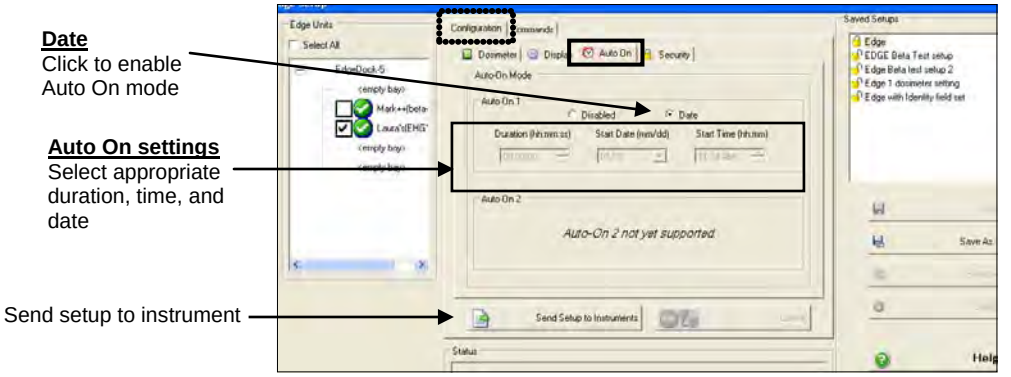

Date
Click to enable Auto On mode
Auto On settings
Select appropriate duration, time, and date
Send setup to instrument
Auto-On 2 not yet supported.

Figure 3-9: Setting the Edge to start automatically

8. After sending to the instrument, turn the Edge off by pressing the On/Off key.

Security: setting secure/lock during your run

You can prevent people from inadvertently terminating a study or changing settings with the lock feature enabled. Initially, this feature is set through QSP-II and is then activated after the dosimeter is running. There are three lock or secure run settings.

☑ ***NOTE:*** *If you wish to enable this feature while running, see "Locking or Unlocking", page 46).*

The following **three lock** settings are available in QSP-II:

☑ **Unlocked**
- o No security feature is enabled.

☑ **Locked (secure with view)**
- o Noted in QSP-II as "Locked" (allow measurement view)." While the dosimeter is running, a lock icon will appear in the top right of the screen and the user can view the data but cannot stop the run unless the lock feature is disabled (See locking/unlocking, page 46).

☑ **Locked (secure all)**

- Noted in QSP-II as “Locked (no measurement view)”. While the dosimeter is running, a large padlock symbol appears in the display as well as the small key symbol in place of the data. The end user cannot see the data and cannot stop the study unless one unlocks the dosimeter. (See locking/unlocking page 46)

➢ **How to set-up secure/lock**

1. Ensure the Edge is docked and the USB cable is connected from the pc to the EdgeDock.
2. From the welcome screen of QSP-II, select the **Edge** and click on the **Setup button** (see Figure 3-1, page 17).
3. Next, click on the **Configuration** tab and then click the **Security tab.**
4. Ensure **Select All** is checked and/or the dosimeter is checked (if using more than one bay, click on the appropriate dosimeters.)
5. Select one of the secure/lock settings by clicking in one of the checkboxes.
6. To change other settings, see settings sections (dosimeter tab, set tab, auto on tab, or clear tab).
7. Or click **Save As** to save the new set-up and name the settings.
8. Alternatively, click **Save** to change the Edge setup under “Saved Setup”. Then, click **Send setup to Instrument.**

Security

Select All
-Or select specific dosimeter

Setting lock mode
- Click on one of the lock modes.

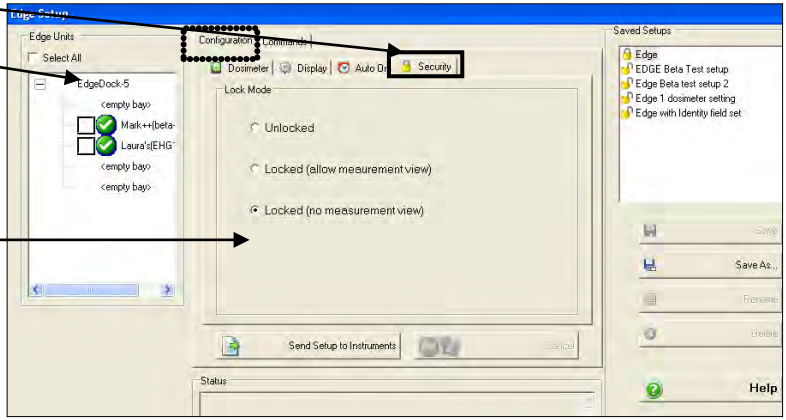


Figure 3-10: Secure/Lock setting

Naming your dosimeter (identity setting)

With the identity setting on the Edge, you have the option of adding a name to the dosimeter. This is a very useful feature if, for example, you have a handful of dosimeters or a couple hundred dosimeters and you want to track who is assigned to each specific dosimeter.

➢ **How to name your dosimeter**

1. Ensure the Edge is **turned on**, **docked**, and the **USB cable** is **connected** from the pc to the EdgeDock.
2. From the welcome screen of QSP-II, select the Edge and click on the **Setup button** (see Figure 3-1, page 17).
3. In the **Display screen**, ensure "identity" appears as one of the "item to display" fields. See diagram below or refer to "Display setting: customizing your views" on page 27 to add this field.

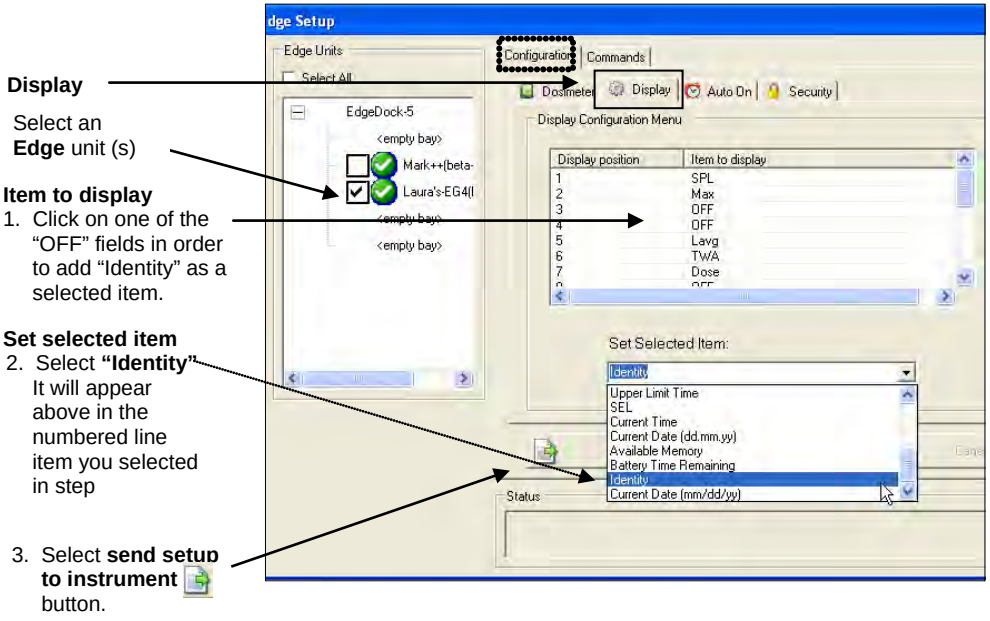


Figure 3-11: Setting identity field

4. Select **Commands** tab and then click on **Identity** tab.
5. In the Identity screen, type in a name/ numbers in the **identity string** field. (Please do not add spaces.)

   ☑ ***NOTE:*** *It will allow up to 12 characters in this field.*

6. Click on **Set Identity** to send this to the dosimeter.
   - To check the dosimeter for the new name, undock the Edge and press the down arrow (this will refresh the dosimeter's display). The new name (or identifier) will appear on the Edge.
   - To pull the identity field (or name) from the dosimeter to QSP-II, click on the **Get Identity**.

   ☑ ***NOTE:*** *if you want to pull the name/identifier back from the dosimeter to QSP-II, you would select "**Get Identity**".*

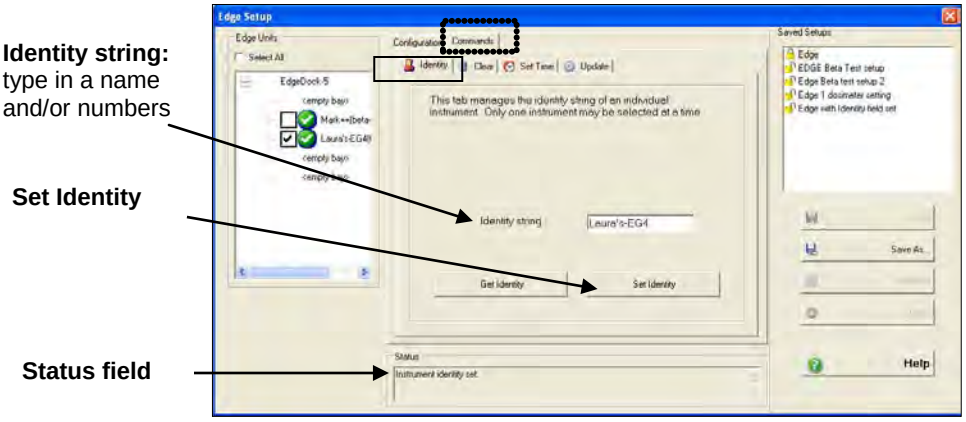
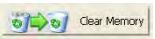


Figure 3-12: Identity screen

Clearing the dosimeter

To clear your data, also referred to as resetting your data, ensure your Edge is docked and you are viewing the setup screen in QSP-II.

➢ **How to clear / reset your data**

1. From the setup button in QSP-II's Edge screen, click on the **Commands** tab.
2. Next, select the **Clear** tab.
3. Ensure **Select All** is checked and/or the dosimeter is checked (if using more than one bay, click on the appropriate dosimeters.)
4. Click on the **Clear memory** button 

   ☑ QSP-II will state that it successfully cleared the dosimeter in the Status field.

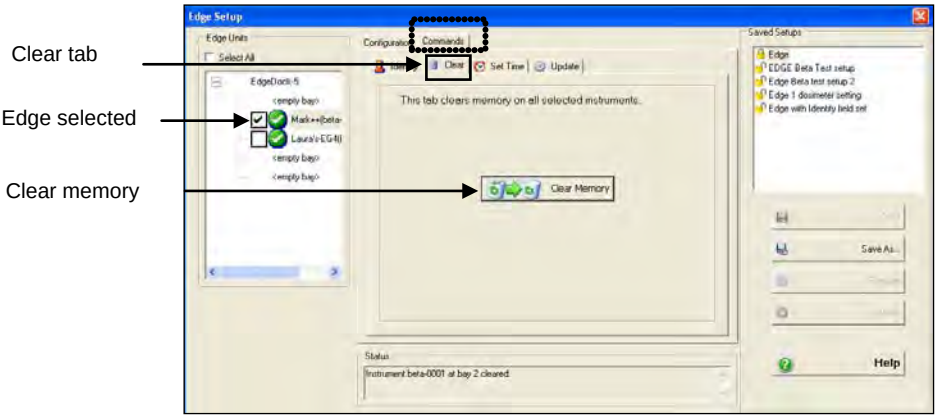


Figure 3-13: Clearing the dosimeter

Set Time setting

As you begin using the Edge, you will want to set the date and time which is performed via QSP-II setup. There are two methods to set the time parameters which are explained in the steps below.

➢ **How to clear/reset your data**

1. Ensure the Edge is **turned on**, **docked**, and the **USB cable** is **connected** from the pc to the EdgeDock.
2. From the welcome screen of QSP-II, select the **Edge** and click on the **Setup button** (see Figure 3-1, page 17).
3. Next, click on the **Command** tab and click **Set Time** tab.

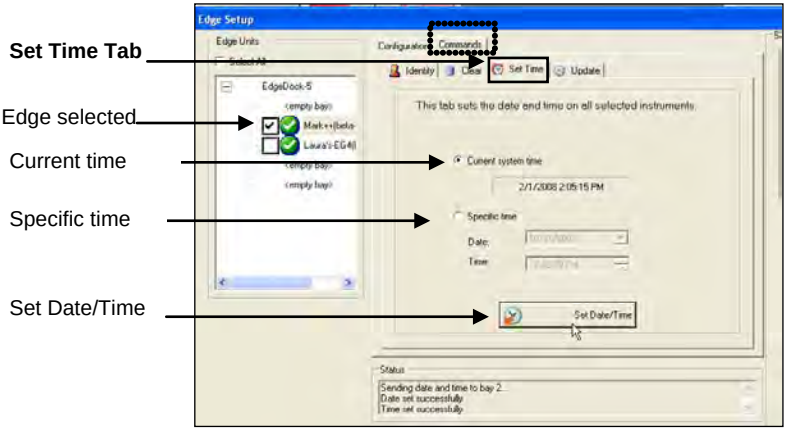


Figure 3-14: Setting date and time in QSP-II

4. Click on the **Select All** button under Edge Units (if using one dosimeter). Or select by expanding the Edge Docking Station and click the appropriate dosimeter(s) (if using the EdgeDock5).
5. To **set date/time,** you have two options:
   - ☑ Ensure **Current system time button** is selected (this is the default setting and will pull the date and time based on your pc settings.)
   - ☑ **Or** click **Specific time** button if you wish to customize the date and time of your pc and select the date and time from the drop down lists.
6. Click **Set Date/Time** button to send this new setting to the instrument.

QSP-II: Updating Edge firmware

Latest firmware (i.e., software) releases are available in the Setup screens via the "Update" screen. When updating, only one dosimeter can be updated at a time and must be updated in bay 1 of an EdgeDock5. (For users with an EdgeDock1, this will not be a concern.) Please follow the steps below and refer to Figure 3-15.

➢ **How to update**

1. Ensure the Edge is turned on, **docked in bay 1**, and the USB cable is connected from the pc to the EdgeDock.
2. From the welcome screen of QSP-II, select the Edge and click on the **Setup** button (see Figure 3-1, page 17).
3. Next, click on the **Command** tab and click **Update** tab.
4. To update the Edge software from Quest's server, ensure **Quest Web Server** is checked.
   - Or if updating from a Disk, click on **File on Disk**.
5. Click on the **Update** button. (This will take a couple minutes.)
   - The status field will display the previous firmware version and then updated firmware version. Lastly, it will state it is completed.

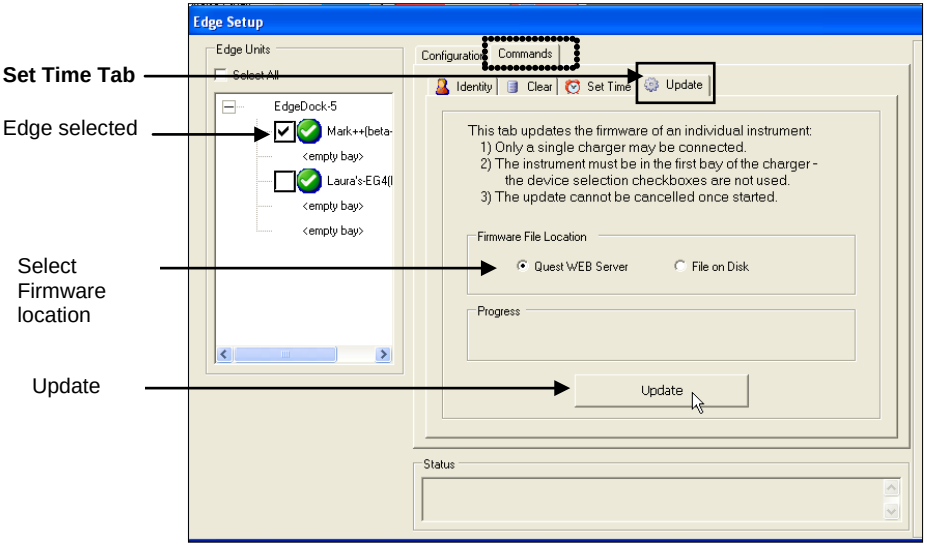


Figure 3-15: Updating Edge Firmware

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CHAPTER

4

Running and operating your dosimeter

As explained in Chapter 3, the view of your display is customizable via QSP-II.

☑ ***NOTE:*** *The subsequent sections show examples of views which you may have disabled on your dosimeter. (Please refer to Chapter 3, "Setting up the Edge via QSP-II".)*

Overview of running a study

The list below is a brief overview of the steps for running a study.

Quick Help List: typical dosimetry session

1. Turn the dosimeter on and check your battery power.
2. Reset the dosimeter.
   - This will clear out all of the data history before your study begins to ensure you have sufficient memory space on the Edge.
3. Set-up your study parameters via QSP-II.
4. Calibrate the dosimeter.
5. Attach the dosimeter for your personal noise study.
6. Press the Run/Stop button to start the study.
7. When you are ready to end your study, press the Run/Stop button to stop the study.
8. Review your results either on the meter or download to QSP-II for further analysis (graphs/charts, saving and printing).

Figure 4-1: Quick help list for running a study

Positioning the Edge on your shirt

Depending on what accessories you ordered with the Edge, you may have either clips on the top and bottom of the dosimeter or some other type of mounting device. (Please refer to **Appendix A**, "Contacting Quest", page 52).

➢ How to attach the dosimeter

1. Clip the dosimeter on your shirt and ensure the microphone is positioned as high on your shoulder as possible and away from your neck.
   a. If the noise seems to come from one direction, place it on the shoulder closet to the noise source.

   b. During monitoring, keep clothing from coming into contact with the windscreen to avoid contaminating your results.

Figure 4-2: Attaching the Edge on your shoulder

Windscreen and maintenance

Before measuring, ensure the windscreen is free from any accumulated dirt. If you ordered a kit (as explained in Chapter 2), there are replacement windscreens in the carrying case for your convenience. Please refer to Figure 6-1, on page 58 for details on replacing the windscreen.

Checking battery power

Typically, the life of the battery is approximately 60+ hours (see **Appendix A** for specific specifications). The dosimeter can be charged at any time by using your EdgeDock.

There are two battery identifiers on the dosimeter which are the battery indicator icon and the battery power clock (see Figure 4-3).

➢ Checking battery power

1. The **battery indicator icon** (located at the top right of your screen) gives an approximation of battery life and is always present.
   - If the battery indicator is half shaded, this illustrates you have approximately 30 hours of battery life remaining.
   - If lobat appears, less than 8 hours of run time is available.
2. Additionally, there is a **battery time remaining measurement** which identifies the number of hours and minutes remaining on the dosimeter.
3. To view, press the up/down arrows ▲/▼. This will navigate your through the views of the dosimeter.

☑ ***NOTE:*** *The battery time remaining measurement can be disabled from the view of the meter. See Chapter 3 for explanation on changing the display.*

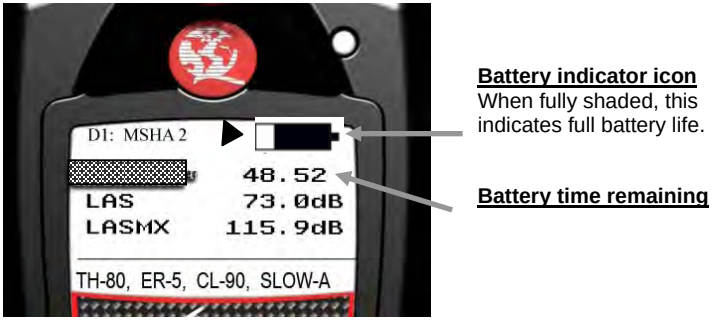


Figure 4-3: Battery indicators

Calibrating

Quest Technologies recommends to calibrate your dosimeter before you run your study(ies) and after your study(ies) to ensure highly accurate measurement results. The steps below address how to calibrate for either a pre or post calibration.

➢ **Calibrating the dosimeter**

1. Remove the windscreen from the dosimeter by unscrewing it. (See Figure 6-1 for an illustration, page 51.)
2. Ensure the Edge is turned on and in the stop mode. (See "Turning on" page 8, and "Turning Off" page 9).
3. Slide the Edge into the mouth of the calibrator.
   ☑ ***NOTE:*** *ensure the adapter ring is inserted into the mouth of the calibrator before you slide the Edge into the cavity.*
4. Turn on the calibrator and ensure parameters are set to 114 dB and 1000 Hz. (*See calibration manual for operation details.)*

Figure 4-4: Calibrating

5. "**CAL**" will flash on the display when detected.
6. Press the **on/off enter** button to trigger the calibration display.
7. To match the values on the calibration display, press repeatedly the **up** or **down** arrow in order to select the exact output on the calibrator (i.e., 114 dB).
8. When you have selected the appropriate dB level, press the **on/off enter** button.

- A shaded bar will appear loading your calibration information. Then a summary calibration screen will appear indicating the db level with date and time displayed.

9. To return to the measurement view screen, press the **on/off enter** .
10. To end the calibration steps, turn off the calibrator. Detach the dosimeter from the calibrator.

Resetting the dosimeter

The Edge can be reset through the dosimeter keypad or via QSP-II. The steps below outline how to reset your dosimeter.

➢ **Reset**

1. Ensure the meter is **Off**.
2. Turn the meter on by pressing the **on/off enter** button.
3. When the splash screen appears, press and **hold** the **run/stop** and **on/off enter** buttons until the splash disappears.

Figure 4-5: Splash screen

4. The **Setup menu** appears on the Edge. Press the **up** or **down arrow** to select the reset icon (symbol).

☑ ***NOTE:*** *Setup menu is used to reset the dosimeter, change the contrast, and return to the main view.*

Reset icon
Checkmark icon
Is the selection to exit the setup menu
Arrows and enter key
Indicates the valid keys are selected

Figure 4-6: Resetting the Edge from the keypad

5. Press and **hold** the **on/off enter** button.
   a. A 3, 2, 1 countdown will appear, and then a shaded bar will appear indicating the dosimeter is being reset.

6. Press the **down arrow** until the checkmark icon is selected (denoted by the arrows). Then, press the **on/off enter** button to return to the measurement view screen.

Setting contrast on dosimeter

➢ **Contrast**

1. Ensure the meter is **Off**.
2. Turn the meter on by pressing the **on/off/enter** button.
3. When the splash screen appears, press and **hold the run/stop and on/off enter** buttons. (See figure 4-5 for splash screen).
4. The **Setup menu** appears on the Edge. Repeatedly press the **arrow key** until the Contrast symbol is selected.

☑ ***NOTE:*** *Setup menu is used to reset the dosimeter, change the contrast, and return to the main view.*

Contrast icon
Checkmark icon
Is the selection to exit the setup menu
Arrows and enter key
Indicates the valid keys are selected

Figure 4-7: Changing the contrast from the keypad

5. Next press the **on/off enter** button.
6. A number will appear on your display (i.e., 50). Press the **up** or **down arrow** to increase or decrease the contrast of the Edge.
7. Press **on/off enter** button to accept the new contrast value.
8. To return to the measurement view screen, press the **down arrow** and press the **on/off/enter** button.

Running studies

With a couple pushes on the keypad buttons, you will be running and viewing your study (ies). Following your study (ies), you can load the data/files into QSP-II to manipulate, analyze, save, and create reports (See Chapter 5 for viewing your logged data in QSP-II).

Starting a run

➢ **How to run a noise study**

1. If your dosimeter is turned off, press the **on/off enter** button to power on.
2. Press and hold the **run/stop** button.
   - A 3, 2, 1 countdown will appear.
3. When running, the following will appear:
   - A run indicator will appear on the top-right side.
   - The LED indicator will flash green (unless you disabled this in QSP-II.)

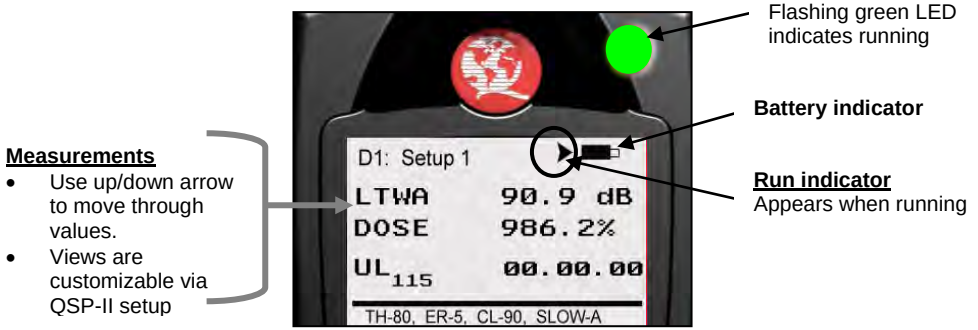


Figure 4-8: Display screen while running

Stopping a study

While the dosimeter is running, you can end the study by pressing and holding the stop button.

➢ **How to stop a noise study**

1. While running, press and hold the **run/stop** button.
   a. A 3, 2, 1 countdown will appear.
   b. The stop indicator ■ will be shown in the display.

Indicators/Icons on the display

The Edge is equipped to notify you of operational/status updates. These indicators (or alert notices) are located on the top right-hand side of the screen. Table 2-2 explains the function of each indicator.

Indicator Icon	Explanation
■	***Stop*** – indicates the dosimeter is currently in the stop status (opposed to run).
▶	***Run*** - indicates the dosimeter is currently logging a study.
	Battery charge status – When completely shaded in black, this indicates full battery power. If half shaded, this represents ½ battery power
OL	***Overload*** **–**will appear whenever the input signal exceeds the range of the dosimeter.

Table 4-1: Indicators (i.e., run, stop, battery, and OL)

Viewing measurements on the display

The up/down arrows on the keypad of the dosimeter enable you to move through the various measurements. For specific information on the views of the Edge, please see "Views on the Edge", page 20).

➢ **Viewing measurements**

1. Press the **up arrow** or the **down arrow** . This will move you through the views on the display.
   ☑ ***NOTE:*** *If you enabled only one measurement to appear on the display, when you press the up/down arrows it will not show any other measurement values. (To enable additional measurement settings, see "Customizing measurement settings in QSP-II", page 2.)*

Locking or securing your dosimeter during run

As explained previously under QSP-II set-up parameters, the security or lock feature is designed to lock the meter during run to ensure the study will not be stopped unless the lock feature is disabled. (Setting this feature is programmed via QSP-II. Please see "security: setting secure/lock feature", page 29 for more details.)

Locking or Securing

➢ How to lock or secure

1. Turn the dosimeter on and press the **run/stop** button to begin logging your study.
2. To enable the lock, press **run/stop** button three consecutive times within one second intervals.
   ☑ The Lock screen will appear.

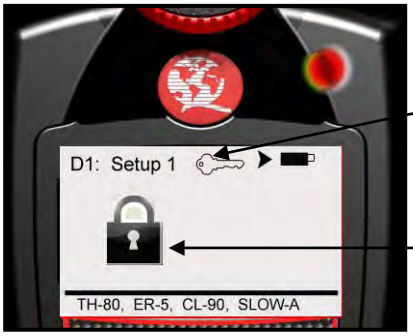


Figure 4-9: Locking/Securing run

☑ ***NOTE:*** *If lock/secure run does not activate, please check that locking is set-up on your dosimeter. Please see "How to set-up secure/lock", page 30 for further details.*

Unlocking

➢ How to unlock

1. To unlock, press **run/stop** button 3 consecutive times, within one second intervals, and then press the **on/off enter** button.
   a. If the padlock icon and the key indicator were on the screen, these will vanish and the measurement view will appear along with the run indicator.
   b. If you enabled the lock feature (with the key indicator showing and the measurement view showing), then the key indicator will disappear.
2. To stop your study, press the **on/off enter** button and the 3, 2, 1 will display as it ends the study.
   a. To download and view your results in QSP-II, please see Chapter 5.)

Viewing your studies in QSP-II

The focus of this chapter is to discuss how to view your studies via QuestSuite Professional II software. The first section explains how to retrieve your studies from the dosimeter, and the subsequent sections will then walk you through viewing, organizing, and customizing your studies.

☑ ***NOTE:*** *You have the option of six different languages in QSP-II including: English, German, French, Spanish, Italian, and Portuguese.*

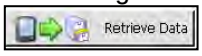
Retrieving your studies into QSP-II

Loading your studies entails loading the software, docking the Edge, and navigating to **retrieve data** button in QSP-II. The software will then automatically pull your noise studies from the dosimeter into QSP-II (also called **downloading**).

➢ How to load your studies

1. Ensure QuestSuite Professional II software is downloaded.
   ☑ Follow the install directions on the cd.
2. Dock the dosimeter and connect it to your pc using the USB cable (see, "Communicating and downloading data" on page 23 for procedures).

Figure 5-1: Communicating between your pc and the Edge

3. **Power on** the Edge (by pressing the **on/off enter** button).
4. From the start-up screen in QSP-II, choose **Acoustics** from **My instruments** section. Select the Edge dosimeter.
5. Select the **Retrieve Data** 

button.

6. Click on **Select All** (under Edge Units) if using EdgeDock1.

☑ If you are using EdgeDock5, click on the appropriate dosimeter name which appears under Edge Units section (i.e., beta-001).

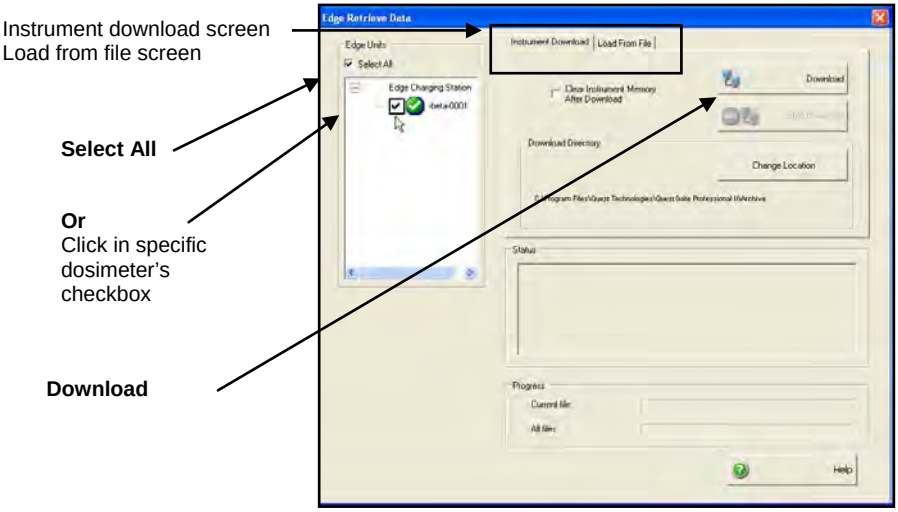


Figure 5-2: Retrieve Data screen in QSP-II

7. Optional step: if you wish to change the location of where your data is stored on you pc, click on **Change location** button. Navigate to the appropriate directory or folder (or click on create new folder and create a new folder) then click **Ok**.
8. Click on **Download** button.
   ☑ In the status field, it will state download is successful.
   ☑ Then, a clear the memory prompt will appear. Click **yes** to clear the memory or click **no** if you wish to save the data on the dosimeter.
9. The studies will load and dock under **Downloaded** node.
   ☑ ***NOTE:*** *Additional features in retrieve data screen.*

Where your studies are stored

Downloaded Node

When you sync the dosimeter to the software and retrieve the files into QSP-II (as explained above in "Retrieving your studies from QSP-II"), these studies are automatically stored under the node titled "Downloaded" and a generic name is assigned to your data.

- ***Analogy:*** *The concept of storing files is similar to how your inbox works in Microsoft Outlook. In Outlook, the files are automatically sent to a general inbox and it is up to you to organize your mail into subfolders. Likewise, with QSP-II, once the files are imported, they are stored in a general inbox called "Downloaded node". With a simple right-click, you can quickly rename the file and create a user-friendly filing system to manage your studies.*

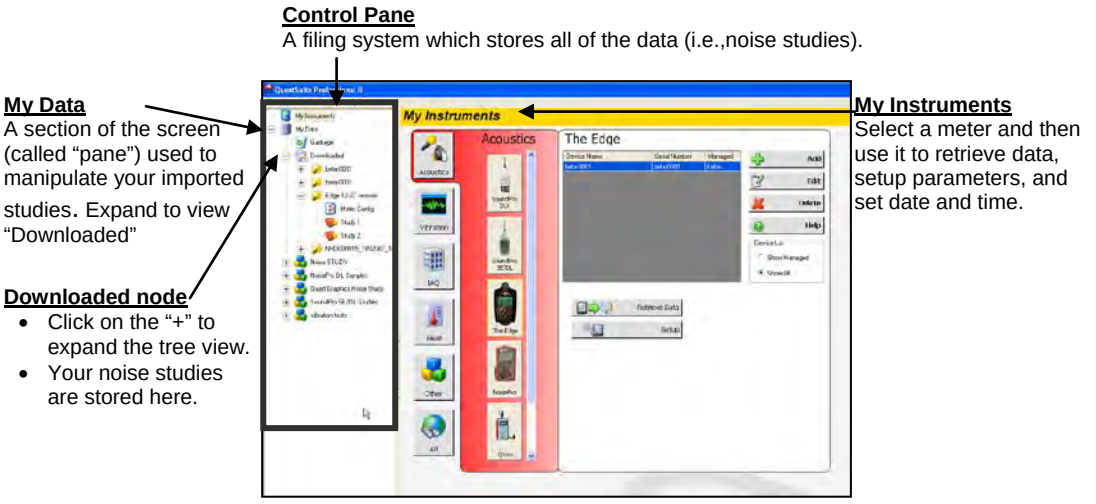

Control Pane
A filing system which stores all of the data (i.e.,noise studies).
My Data
A section of the screen (called "pane") used to manipulate your imported studies. Expand to view "Downloaded"
Downloaded node
Click on the "+" to expand the tree view.
Your noise studies are stored here.
My Instruments
Select a meter and then use it to retrieve data, setup parameters, and set date and time.
My Instruments
Acoustics
The Edge

Figure 5-3: Viewing your studies from QSP-II

➢ **How to retrieve past data/studies**

1. From the start-up screen in QSP-II, choose **Acoustics** from **My instruments** section. Select the Edge dosimeter.
2. Select the **Retrieve Data** button.
3. Click on the **Load from File** tab (see Figure 5-2) and then select **Extract Previously Downloaded File** button.

   ☑ QSP-II will display a prompt indicating if your file was retrieved.
   ☑ When completed, close the retrieve screen.
   ☑ To view your retrieved study, see Figure 5-4.

Viewing your Edge data in QSP-II

➢ **How to view studies in QSP-II**

1. Expand "**My Data**" node by clicking on the "**+**" sign.
2. On the **Downloaded node,** click on the "**+**" sign to expand the node/file cabinet.

   ☑ Your Noise studies will display under the folder system.
3. Next, click on Session folder, then click on the **Noise Study** which is indicated with a red book icon.

   ☑ ***NOTE:*** *Refer to Table 5-1 for detailed explanation of QSP-II's filing system.*

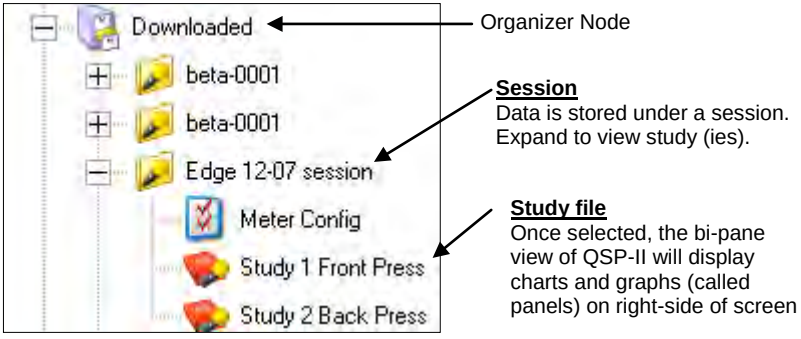


Figure 5-4: Downloaded studies

Filing system	Explanation
Organizer Node	Used to organize your noise studies. When studies are first retrieved/downloaded they are stored under the "Downloaded Node". You can organize your studies into topics as you may do with your email system or your computer files. • Right-click to display the menu options (rename, find, delete, add a node, combine a node, export)
Meter Config	In a table format, this displays the set-up parameters (i.e. thresholds, peak, logging, auto-run, etc..) or "meter configuration" of the particular study.
Noise Session	A session folder stores one study or a series of studies. A number of studies in a session file depend on the number of studies (Run/Stops) that are stored in the dosimeter when you retrieve data. (The data will stay on the dosimeter until you clear it.) A session folder will list group summaries of the study data. For example, if you have three studies under the session folder, and the highest peak value was 139.2 dB, the session folder would list the highest Peak value within the three studies as 139.2 dB. To review the results of the particular study, you would expand out the session folder and analyze the appropriate study data.
Noise Study	A noise study is comprised of data from one sampling (performed when you press Run then Stop on the dosimeter). Once selected, you can customize the panels (charts/graphs) and reporting features. • Right-click to display the menu options (export, print report)
Session eport	If you created a report, this will store as an Acrobat Adobe .pdf file under the study file.

Table 5-1: Downloading data in QSP-II explained

4. The right-side pane displays graphs and charts which are customizable via the layout icon toolbar. (For further information, please refer to QSP-II's Help Contents.

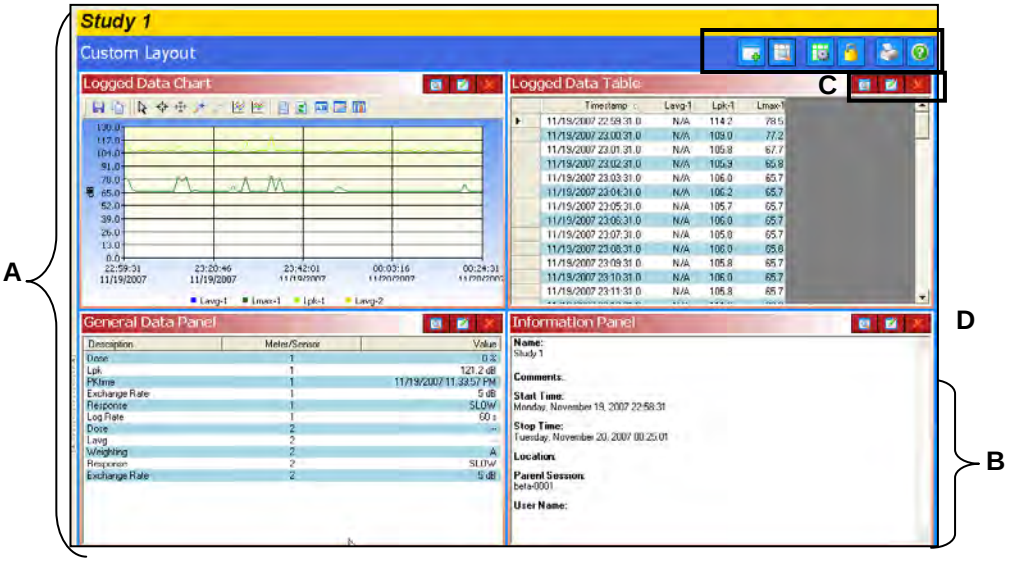


Figure 5-5: Viewing layout view (charts and graphs) in QSP-II

Graphs & Charts layout view	Explanation
A. Layout	QSP-II is divided into two panes (or sections). One is the layout view and the second pane is the "control pane". The layout is divided into "panels", also known as charts and graphs. You can add charts and/or graphs, move them in the appropriate position, and/or customize the data values.
B. Panel	For the Edge, the standard layout has three panels. The panels can be moved, edited, and expanded or collapsed. (see "Chart and Graph icons)
C. Chart & Graph icons	Used to enlarge or hide a panel (also called chart or graph), edit the data, or close the view. ☑ Expand or Collapse the panel (graph/chart) ☑ Edit (edit the parameters of the selected screen) ☑ Delete (closes the window)
D. Layout icon toolbar	This toolbar is used to add tables and/or charts, arrange tables or charts, manage the layout view, lock it, print reports and access to the help files.

Table 5-2: Explanation of panels (graphs and charts) components

Adding panels (charts/graphs)

1. Ensure you selected the appropriate study and are viewing panels (graphs/charts) on the right-hand side of your screen.
2. Click on the **Add** icon.
3. Select a chart or graph. An edit screen may appear. Select the appropriate settings and click **Ok**. It will display on your screen.

Saving your customized layout(charts/graphs)

You may have spent some time organizing your study data by adding new charts and/or graphs, rearranging the panes (right-click on a graph/chart heading and drag and drop to a specific spot), and/or editing the logged data values. With the save template button, you can save your customized layout so every time you open a study the appropriate charts and graphs are displayed.

➢ **How to save and apply a layout**

1. In the layout view of QSP-II, click on the **Manage Templates** icon (see layout icon toolbar in Figure 5-5).
   a. The Manage Session Templates screen will appear.
2. To create a new template, type a name in the **Templates Name field**.
3. Click the Save **Template button**.
4. Select the appropriate template name in the "available templates field" and Click the **Apply Template button**.

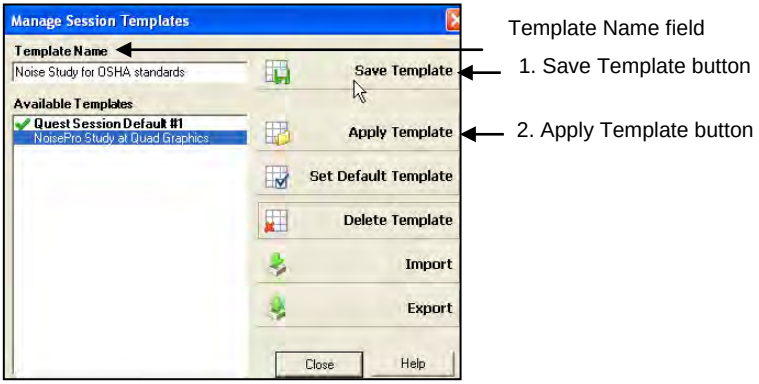


Figure 5-6: Saving a customized template of the layout view (charts/graphs)

Creating reports

QSP-II reports are saved in Adobe PDF format for easy viewing and printing.

☑ ***NOTE:*** *The report will print in the order that the panels (charts/graphs) appear on your computer screen. To rearrange, click on the title of a chart or table, drag, and drop a chart/table on the title bar of a panel.*

⃠ If your cursor displays this icon,⃠, it indicates the panel cannot be dropped into the current position of your cursor.

□ If your cursor displays this icon,□, it indicates the panel can be inserted into the current position of your cursor. Viewing and printing reports

➢ **Generating a Session or Study Report**

1. Right-click a Session or Study and select **Print Session** from the menu.
   - The report will dock under the study node.
   - To remove, **right-click** the report and click **Delete Report**.
   - To save the report in an alternative folder/directory (i.e., on your desktop and then you can email it and share the information.), select **Save As** and add it to a directory or folder on your pc (or network).
2. Alternatively, select the **Printer Icon** when the Session or Study data is displayed in the chart and tables panels.
3. When the Generate Reports Icon is selected, the following screen will appear.

Figure 5-7: Sample Edge Report in QSP-II

CHAPTER

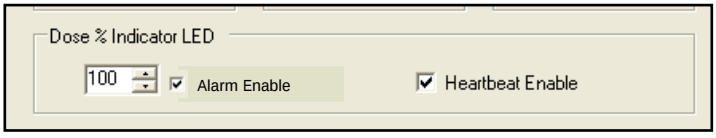
6

Technical Support

LED indicator: disable/enable

Some users may prefer to turn off the LED indicator.

☑ To disable this feature, open QSP-II and select the Setup button. On the dosimeter tab, under Dose% indicator LED uncheck the following:



☑ **Alarm enable:** Will disable the flashing red LED when the threshold entered exceeds the designated value during run mode. (If checked, red LED will flash.)

☑ **Heartbeat enable:** Will disable the flashing green LED the dosimeter is running. (If checked, a green LED will not flash.)

- ***NOTE:*** *For more information, see section on Dosimeter Settings, page 25.*

Replacing microphone and windscreen

Attaching/Detaching

The Edge features a field replaceable microphone and a screw-on removable windscreen. Quest suggests that the user replace the windscreen whenever dirt has accumulated on the windscreen prior to measuring data.

☑ ***NOTE:*** *If you ordered an Edge kit, extra windscreen(s) will be included in your case.*

➢ **Attaching/Detaching the windscreen and microphone**

1. First, unscrew the windscreen by turning the red ring (not the foam!) in a counterclockwise direction.
   - If you are replacing the windscreen, screw on a new windscreen in a clockwise direction until it fits firmly.
2. To unscrew the microphone, turn the microphone in a counterclockwise direction until it is removed.
   - To attach a new microphone, screw the microphone on clockwise until it fits tightly.

The following diagram illustrates how to assemble these two devices.

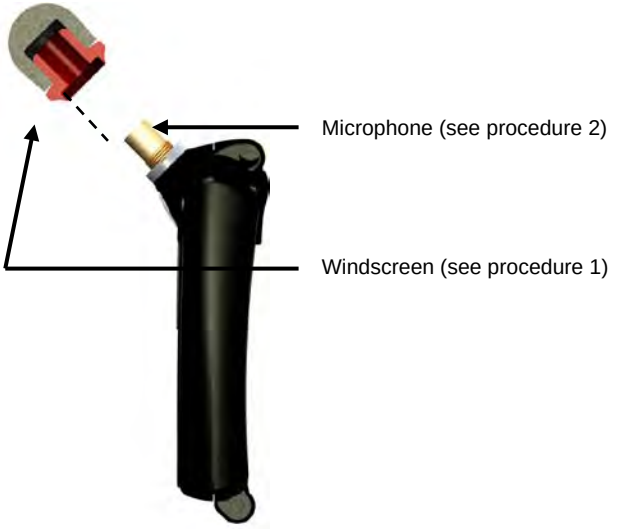


Figure 6-1: Microphone and windscreen assembly

Hard Hat Attachment Kit

The following instructions explain how to assemble and attach the hard hat kit to a standard hard hat.

Hard Hat Attachment kit
A. Epaulette mount
B. Hard hat mount

1. Using a 3/32" hex wrench, twist the top shoulder bolt counterclockwise to loosen and remove the bolt and the clip. Also, remove the bottom clip with the hex wrench. Once the bottom clip is removed, place the shoulder bolt back into its place and tighten back up with the hex wrench.

2. Place the epaulette mount (see "A" above) into the top bracket of the Edge. Then slide the bolt into place and tighten with a hex wrench. Then, the epaulette mount snaps onto the bottom shoulder bolt.

3. Slide the two prongs of the hard hat mount (see "B" above) underneath the epaulette mount (see "A above) until it clicks into place.

4. Taking the Edge with the assembled hard hat attachments, slide into the side of hard hat. It will fit snuggly into the hard hat opening.

APPENDIX

A

SPECIFICATIONS

**All specifications subject to change

Standards

Pending testing approvals on the following:

- ANSI S1.25, IEC61252 Standards for Personal Sound Exposure Meters.
- Lead Free (RoHS compliant).

Mechanical characteristics

Housing	Plastic case with black, gray check background and red outlined buttons.
Size	3.5” long x 2.1” wide x .75” thick (without microphone) (88 mm long x 53 mm wide x 19 mm thick)
Weight	2.5 oz (less mounting device); (70.87 gr)

Electrical characteristics

Battery

Life	Approximately **60+** hours of continuous operation at normal operation under reference to environmental conditions when full capacity batteries are installed.
Type	Lithium Polymer (Flat cell)
Memory capacity	180 hours

Environmental effects

The typical time interval needed to stabilize after changes in environmental conditions is 5 minutes for each 10 C change.

Temperature

Operating	+14 ºF to + 122 ºF (-10 ºC to + 50ºC).
Storage	-13 ºF to + 140 ºF (-25 ºC to + 60 ºC).
Humidity Range	0 to 95% Non-Condensing

User Interface

Display

Size: 128 X 64 graphic

Keypad

4 keys Up arrow, down arrow, run/stop, on/off enter.

EdgeDock1 and EdgeDock5

EdgeDock1 and EdgeDock5 are powered by a 12-volt charger adapter with international plug adapters. The backside of the Edge slides into the hook of the EdgeDock1 or EdgeDock5 with the mounting clasps rotating to a 90 degree angle (which will rest on a table/work area). Additionally, the EdgeDock1 (or EdgeDock5) are equipped with two single screw slots for wall mounting purposes.

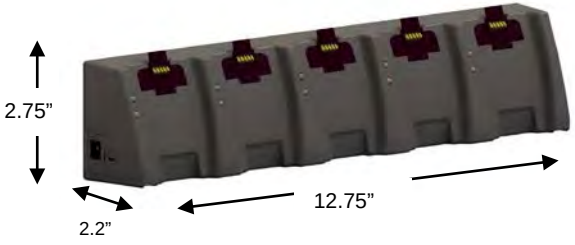
Physical attributes of EdgeDock1 and EdgeDock5

LED amber indicator — Indicates EdgeDock1 or EdgeDock5 is “powered on”. (Lower of the 2 shown led’s).

LED Red indicator and LED Green indicator — Signifies status of charging. Flashing red indicates charging. Solid green indicates charging is complete.

Size of EdgeDock1 — 2.75” x 2.75” x 2.2” (6.99 cm x 6.99 cm x 5.6 cm)

Size of EdgeDock5 — 12.75” x 2.2” x 2.75” (32.29 cm x 5.08 cm x 6.99 cm)



Measurements

Types

Displayed Data and status indicators	SPL, Average value (L_{avg} or L_{eq}), Maximum value (L_{mx}), Minimum value (L_{Mn}), Peak Value (L_{pk}), Exposure, Run Time, TWA, UL Time

Measurement parameters

Dosimeters	Up to two dosimeters at once (eg4), each with its own assignable profile (via QSP-II only).
RMS Range	70 to 140 dB
RMS Weighting	A or C weighting
RMS Time Response	Fast or Slow
Exchange Rate (ER)	3 dB, 4 dB, or 5 dB
Peak Range	110 dB to 143 dB
Peak Weighting	C or Z weighting
Criterion Levels	70 to 90 dB in 1 dB increments
Threshold	70 to 90 db in 1 dB increments
Upper Limit (UL)	70 to 140 dB in 1 dB increments

Calibration

Pre-calibration	When performed, valid prior to the start of the study.
Post-calibration	When performed, valid for the previous study.
Storage	Calibrations for a study are stored in the related study file.
Calibrator requirement	Calibrations should be performed at 114 dB at 1kHz.

Communications

The Edge communicates via the EdgeDock1 and/or the EdgeDock5. Communications is supported via USB cable from the docking station to the PC.

Special functions

Security

Key sequence protection through the keypad when running.

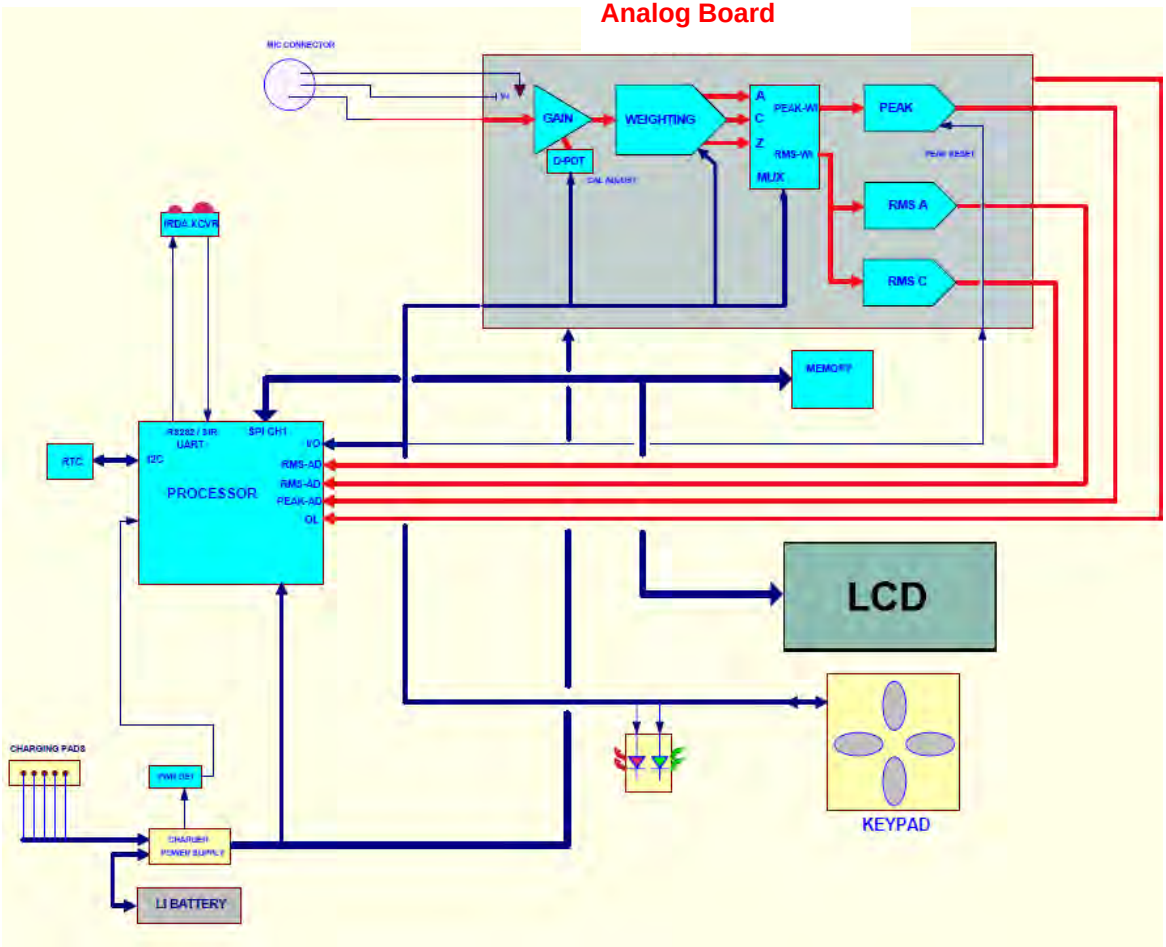
Auto-Run

May be programmed via QSP-II.

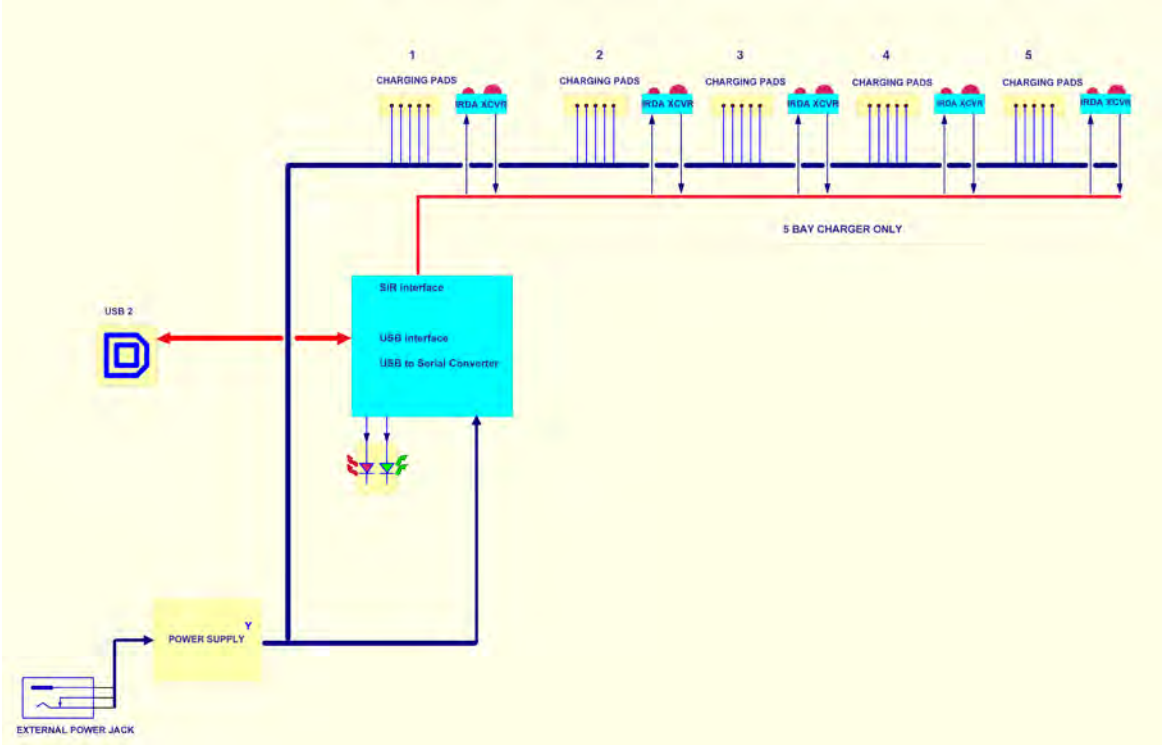
Logging (eg4 only)

The **eg4** is a **dual dosimeter** with data logging which includes Lavg or Leq(1/2), Max level, and Peak level.

Edge Block Diagram



Edge Block Diagram (continued)



Quest Service

Contacting Quest Technologies

Should your Quest Technologies equipment need to be returned for repair or for recalibration, please contact the service department at the following number or access the online form via the website.

- **Service Department:** 1 (800) 245-0779. Office hours are 8:00 a.m. to 5:00 p.m. United States Central.
  - Contact Quest via e-mail at quest.mail@mmm.com
  - **Fax:** +1 262/567-4047
    - ✓ Request a **Return Authorization number**.
- **Internet:** www.quest-technologies.com

If you have questions about the calibrator's operation, please contact Quest Technologies and ask for Technical Support.

- **Telephone:** +1 262/567-9157 or 800-245-0779 within the USA

International customers

Contact your local, factory-authorized distributor from whom the product was purchased. You can obtain the name and contact information of your local factory-authorized distributor from Quest by using the e-mail, telephone, or fax information given under "Contacting Quest Technologies" above.

Warranty

Quest Technologies warrants our instruments to be free from defects in materials and workmanship for one year under normal conditions of use and service. For United States customers, we will replace or repair (our option) defective instruments at no charge, excluding batteries, abuse, misuse, alterations, physical damage, or instruments previously repaired by other than Quest Technologies. Microphones, sensors, printers, and chart recorders may have shorter or longer warranty periods. This warranty states our total obligation in place of any other warranties expresses or implied. Our warranty does not include any liability or obligation directly resulting from any defective instrument or product or any associated damages, injuries, or property loss, including loss of use or measurement data.

For warranty outside the United States, a minimum of one year warranty, applies subject to the same limitation and exceptions as above with service provided or arranged through the authorized Quest distributor or our Quest European Service Laboratory. Foreign purchases should contact the local Quest authorized sales agent for details.

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APPENDIX

B

Glossary of Terms

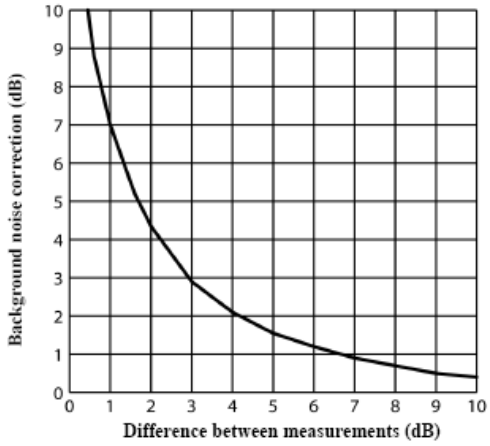
Background Noise, effects of

Background noise can cause considerable error in measurement when its level is high relative to the level of a noise source of interest. If you can make measurements both with and without the contribution of a noise source of interest, you can mathematically subtract the background noise from the combined measurement, yielding the level of the noise source of interest alone. The accuracy of this determination improves as the difference between the two measurements increases.

To remove background noise

1. Obtain a measurement that includes the contribution of the noise source of interest (the combined measurement).
2. Make a second measurement under exactly the same conditions as in Step 1 but without the presence of the noise source of interest (the background noise measurement).
3. Determine the decibel difference between these two measurements.
4. Find that difference on the x-axis of the figure below.
5. Find the point on the curve directly above this difference.
6. Read the corresponding value on the y-axis for that point (the correction value).
7. Subtract the correction value from the combined measurement.

Example: Measurements with and without the noise source of interest are 91 dB and 90 dB, respectively. For a difference of 1 dB, the background noise correction value is 7 dB. Therefore the level for the noise source of interest without the noisy background is 84 dB.

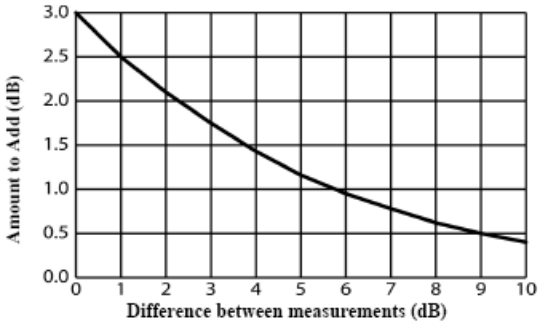


Combining Noise sources

Because sound levels are measured in decibels they cannot be simply added together. A sound level of 90dB plus 90dB does not yield 180dB but rather 93dB. The procedure for mathematically determining a combined level of sound from independent measurements made for two noise sources is given below.

1. Make independent measurements for both noise sources, where each exists without the presence of the other.
2. Determine the decibel difference between these two measurements.
3. Find that difference on the x-axis of the figure below.
4. Find the point on the curve directly above this difference.
5. Read the corresponding value on the y-axis for that point (the Amount to Add).
6. Add this value to the larger of the two measurements.

Example: Independent measurements for the two noise sources yielded levels of 90 dB and 91 dB. For a difference of 1 dB, the correction factor taken from the curve below is 2.5 dB. Therefore the combined level when these two sound sources are present in the measurement area at the same time 93.5 dB.



Crest Factor

Crest Factor is the ratio of the instantaneous peak value of a wave to its RMS value. This is a performance specification of a meter's ability to process signals that have peaks that are substantially higher than their RMS averages.

Criterion Level (CL)

Criterion level is the average SPL that will result in a 100% dose over the Criterion time, usually 8 hours. The Criterion Level is typically set by a regulating agency, such as OSHA, and is not usually applicable for community noise monitoring. Examples: OSHA mandates the Criterion Level (maximum allowable accumulated noise exposure) to be 90 dB for 8 hours. For an 8-hour sample, an average level (LAVG) of 90 dB will result in 100% dose. For the OSHA HEARING CONSERVATION AMENDMENT, the "action level" is 85 dB for 8 hours. This would result in a 50% dose reading. Note that the Criterion Level has not changed. (If the Criterion Level were changed to 85 dB then an 8-hour average of 85 dB would result in 100% dose.)

Criterion Time

The time over which the Criterion Level is established, generally 8 hours.

Decibel (dB)

Sound Level Meters use the decibel as the unit of measure known as Sound Pressure Level (SPL). SPL uses the ratio between a reference level of 20 microPascals (.00002 Pascals) and the level being measured. SPL = 20 log (measured level/reference level). Example: the SPL for 1 Pascal is 20 log (1 Pascal/.00002 Pascal) = 94dB 20 microPascals (.00002 Pascals) is considered the average threshold of hearing. A whisper is about 20 dB. A normal conversation is typically from 60 to 70 dB, and a noisy factory from 90 to 100 dB. Loud thunder is approximately 110 dB, and 120 dB borders on the threshold of pain.

Dose

Related to the Criterion Level, a dose reading of 100% is the maximum allowable exposure to accumulated noise. For OSHA, 100% dose occurs for an average sound level of 90 dB over an 8 hour period (or any equivalent exposure). By using a TWA reading rather than the average sound level, the time period is no longer explicitly needed. A TWA of 90 dB is the equivalent of 100% dose. The dose will double (halve) every time the TWA increases (decreases) by the Exchange Rate. Example: OSHA uses an Exchange Rate of 5 dB. Suppose the TWA is 100 dB. The dose would double for each 5 dB increase over the Criterion Level of 90 dB. The resulting dose is therefore 400%. If the TWA was instead equal to 80 dB then the dose would halve for each 5 dB below the Criterion Level. The resulting dose would be 25%. When taking noise samples less that the full workday, dose is an easy number to work with because it is linear with respect to time. Example: If a 0.5-hour sample results in 9% dose and the workday is 7.5 hours long, then the dose for the full workday would be a 135% dose (7.5 / 0.5 x 9%). This is computed making the assumption that the sampled noise will continue at the same levels for the full 7.5-hour workday.

Exchange Rate (ER – also known as the Doubling Rate)

Exchange rate refers to how the sound energy is averaged over time. Using the decibel scale, every time the sound energy doubles, the measured level increases by 3dB. This is the 3dB exchange rate that most of the world uses. For every increase of 3dB in the time weighted average, the measured DOSE would double. Some organizations such as OSHA in the U.S. have argued that the human ear self compensates for changing noise levels and they felt that the 3dB exchange rate should be changed to more closely match the response of the human ear. OSHA currently uses a 5dB exchange rate, which would mean that the reported DOSE would double with every 5dB increase in the time weighted average. The exchange rate affects the integrated reading LAVG, DOSE, and TWA but does not affect the instantaneous sound level.

Field Calibration (vs. Factory Calibration), pre-calibration, post-calibration

To be sure the dosimeter is functioning within specified tolerance limits, it should be returned to the factory annually for a factory recalibration. To verify that the dosimeter is measuring properly during normal use, field calibrations should be performed. Pre-calibration is performed prior to any data being recorded by the dosimeter. During a pre-calibration, the dosimeter level may be adjusted to match the calibrator output level. Post-calibration is a simple verification that the instrument has remained in calibration throughout the measurement period.

Free field setting (microphone)

Measurements made in an area without sound reflections, diffractions and absorptions caused by nearby objects (including the operator). Sound waves are free to spread out continuously, like ripples on a pond, without reflection. When making free field measurements with a dosimeter set up for use as a sound level meter, the microphone is typically pointed directly at the sound source.

Hearing Conservation (HC)

The Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Administration (MSHA) provide regulatory standards for hearing conservation programs. In addition, the American Conference of Governmental Industrial Hygienists (ACGIH) provides industrial standards for hearing conservation programs. **http://www.osha.gov/ , http://www.msha.gov/ , http://www.acgih.org/home.htm**

Hertz (Hz)

Unit of vibration frequency in cycles per second.

Lavg (Average Level)

Lavg is the average sound level measured over the run time. This becomes a bit confusing when thresholds are used. Any sound below the threshold is not included in this average. Remember that sound is measured in the logarithmic scale of decibels therefore the average cannot be computed by simply .adding the levels and dividing by the number of samples. When averaging decibels, short durations of high levels can significantly contribute to the average level. Example: Assume the threshold is set to 80 dB and the Exchange Rate is 5 dB (the settings of OSHA's Hearing Conservation Amendment). Consider taking a one-hour noise measurement in an office where the A-weighted sound level was typically between 50 dB and 70 dB. If the sound level never exceeded the 80 dB threshold during the one hour period, then the Lavg would not indicate any reading at all. If 80 dB was exceeded for only a few seconds due to a telephone ringing near the instrument, then only those seconds will contribute to the Lavg resulting in a level perhaps around 40 dB (notably lower than the actual levels in the environment).

Lep,d

Daily personal noise exposure level.

Leq (Equivalent Level)

The true equivalent sound level measured over the run time. The term LEQ is functionally the same as LAVG except that it is only used when the Exchange Rate is set to 3 dB and the threshold is set to none.

Logging

(Also called Data Logging.) Certain measurements, such as average level (Lavg) and maximum level (max), can be recorded by the dosimeter at regular intervals. For example: A dosimeter is set to log Lavg and max at one minute logging intervals. If the dosimeter runs for one hour, then it would log 60 Lavg results and 60 max levels. You would be able to see the average and maximum levels for each minute of the one hour run time.

Maximum Level (Lmax)

The highest sampled sound level during the instrument's run time allowing for the unit's Response Time setting (Fast or Slow).

Measurement Range

The decibel range within which the unit's measurements are valid.

Minimum Level (Lmin)

The lowest sampled sound level during the instrument's run time allowing for the unit's Response Time setting (Fast or Slow).

Noise Floor

In a "Perfectly Quiet" room, the electrical noise produced by the microphone is approximately 35 dB on A-weighting and 45 dB on C-weighting. These levels are known as the Noise Floor of the instrument. The Noise Floor can cause inaccurate measurements at low measurement levels. Measurements must always be at least 5 dB above the Noise Floor to be valid. Therefore, the lowest valid measurements of the dosimeter are approximately 40 dB on A-Weighting and 50 dB on C-Weighting.

Peak Level

Peak is the highest instantaneous sound level that the microphone detects. Unlike the Max Level, the peak is detected independently of the unit's Response Time setting (Fast or Slow). Example: The peak circuitry is very sensitive. Test this by simply blowing across the microphone. You will notice that the peak reading may be 120 dB or greater. When taking a long-term noise sample (such as a typical 8-hour workday sample for OSHA compliance), the peak level is often very high. Because brushing the microphone over a shirt collar or accidentally bumping it can cause such a high reading, the user must be careful of placing too much emphasis on the reading.

PEL (Permissible Exposure Level)

The A-weighted sound level at which exposure for a Criterion Time, typically eight hours, accumulates a 100% noise dose.

Projected Time

The variable amount of time used to make a projected dose calculation from an actual dose measurement.

Random incidence (microphone)

This only applies to Class/Type 1 microphones. Measurements made in an area where sound waves are coming from all directions, including reflections and diffractions. When the dosimeter is being used as a sound level meter in an area where reflections and diffractions from nearby objects are present, use the Random Incidence Corrector with the microphone, and angle the microphone at approximately 70 degrees. Most personal noise dosimetry applications do not require the random incidence corrector, since they are not measured with a Class/Type 1 microphone.

Response Time

The response determines how quickly the unit responds to fluctuating noise. Fast has a time constant of 125 milliseconds. Slow has a time constant of 1 second. Example: Typically, noise is not constant. If you were to try to read the sound level without a response time, the readings would fluctuate so much that determining the actual level would be extremely difficult. Using a response of slow or fast simply smoothes the noise fluctuation and makes the sound level easier to work with. While the terms slow and fast have very specific meanings (time constraints), they work very much as you would expect. The fast response would result in a more fluctuating sound level reading than would the slow response. The OSHA regulations require the slow response.

RMS (Root Mean Square)

The RMS voltage of a signal is computed by squaring the instantaneous voltage, integrating over the desired time, and taking the square root. Simply put, the RMS values are the results from the dosimeter with the response time and weighting settings taken into account.

SEL/Lxe (Sound Exposure Level)

The sound exposure level averages the sampled sound over a one second period. Assuming the sampled run time to be greater than one second, SEL is the equivalent one-second noise that would be equal in energy to the noise that was sampled. SEL is typically measured using a 3dB exchange rate without a threshold. SEL is not used by OSHA. Example: Suppose you wanted to measure in a location next to railroad tracks, which also happened to be in the takeoff path of an airport. A train passes by taking 10 minutes with an average sound level of 82dB. A jet passes overhead taking 45 seconds with an average level of 96dB. Which of these events results in more sound energy? You can answer the question by comparing their SEL readings, which compress each event into an equivalent one-second occurrence. SEL for the train = 109.7dB, SEL for the jet = 112.5dB.

Threshold

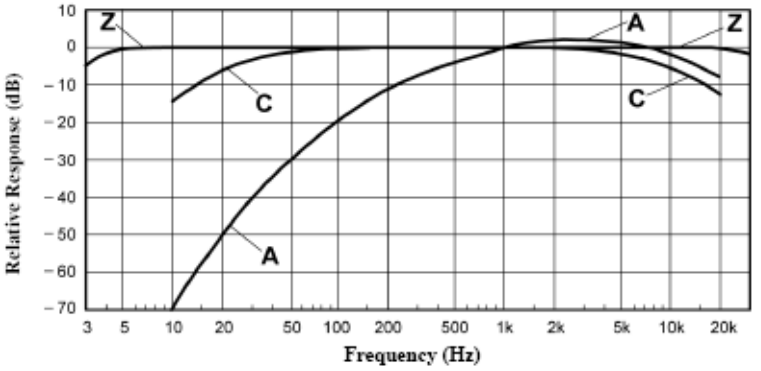
The threshold affects the Lavg, TWA, and Dose measurements. All sound below the threshold is considered nonexistent noise for the averaging and integrating functions. The threshold does not affect measurements in the sound level mode. OSHA uses two different thresholds. The original Occupational Noise Exposure Standard (1971) used a 90dB threshold and called for engineering controls to reduce the noise levels if the eight-hour TWA was greater than 90dB. The Hearing Conservation Amendment (1983) uses an 80dB threshold and calls for a hearing conservation program to be put in place if the eight-hour TWA exceeds 85dB (50% dose). The Hearing Conservation Amendment is the more stringent of the two rulings and is what most US industrial users are concerned with. Example: With an 80dB threshold, suppose you placed a 79dB calibrator on the unit for a period of time. Because all of the noise is below the threshold, there would be no average (you can think of it as an average of 0dB). If the calibrator were 80dB instead, then the average would be 80dB. On histogram printouts, typically 1 minute (or other specified increment) averages are printed. Because real noise fluctuates, it is quite possible to have an average level below the threshold. This also applies for the overall Lavg.

TWA (Time Weighted Average)

The time weighted average always averages the sampled sound over an 8-hour period. TWA starts at zero and grows. The TWA is less than the Lavg for a duration of less than eight hours, exactly equal to the Lavg at eight hours, and grows higher than Lavg after eight hours. TWA represents a constant sound level lasting eight hours that would result in the equivalent sound energy as the noise that was sampled. Example: Think of TWA as having a large 8-hour container that stores sound energy. If you run a dosimeter for 2 hours, your Lavg is the average level for those 2 hours - consider this a smaller 2-hour container filled with sound energy. For TWA, take the smaller 2-hour container and pour that energy into the larger 8 hour TWA container. The TWA level will be lower. Again, TWA is ALWAYS based on the 8-hour container. When measuring using OSHA's guidelines, TWA is the proper number to report provided that the full work shift was measured. Example: If the work shift is 6.5 hours long, then measure for the entire 6.5 hours. TWA is the correct level to report to OSHA. It does not have to be modified.

Weighting (A, C, Z, etc.)

"A", "B", "C", "Z" and LINEAR are the standard weighting networks available. These are frequency filters that cover the frequency range of human hearing (20Hz to 20 kHz). "A" weighting is the most commonly used filter in both industrial noise applications (OSHA) and community noise regulations. "A" weighted measurements are often reported as dBA. The "A" weighted filter attempts to make the dosimeter respond closer to the way the human ear hears. It attenuates the frequencies below several hundred hertz as well as the high frequencies above six thousand hertz. "B" weighting is similar to "A" weighting but with less attenuation. The "B" weighting is very seldom, if ever, used. The "C" weighting provides a fairly flat frequency response with only slight attenuation of the very high and very low frequencies. "C" weighting is intended to represent how the ear perceives sound at high decibel levels and is often used as a "flat" response when LINEAR is not available. "C" weighted measurements are often reported as dBC. "Z" is zero weighting, with no weighting across the frequency range of human hearing. LINEAR is thought of as having a flat frequency response curve over the entire measurement frequency range. LINEAR is most commonly found on upper model sound level meters and is typically used when performing octave band filter analysis.



Upper Limit (UL)

A type of measurement parameter setting in which the user selects a certain decibel level. The dosimeter will then record the amount of time that the sound level was at or greater than the preset level. This time is then recorded as "UL Time"

Windscreen

A windscreen is a covering for the microphone that reduces disturbances caused by wind and direct contact with other surfaces. The windscreen is placed over the microphone when taking measurements to help prevent false high readings due to wind blowing across the microphone or objects (hair, clothing, etc.) brushing against the microphone. The windscreen will also help protect the microphone from dust and debris.

Measurement equations

The following equations are used in the Edge calculations. Some of the terms used in these equations are explained in Table B-1 while others are explained above in the "Glossary of Terms" section.

$$DOSE = \frac{100}{TC}\left[\int_0^{RTIME} 2^{(LS-CL)/(ER)}\,dt\right]\%$$

$$Prd_{8\ hours} = DOSE \times \frac{TC}{RTIME}\%$$

$$Prd_{\times\ hours} = DOSE \times \frac{Pr\ t}{RTIME}\%$$

$$L_{AVG} = ER\left[\log_2 \int_2^{LS/3.01} dt - \log 2(RTIME)\right] dB$$

INDEX

A

Attaching
the Edge 38
Auto On
Setting 28

B

Background Noise, effects of
Defined 68
Battery
Checking 39
Battery charge status 44
Battery indicator icon 39

C

Calibrate your meter 40
Calibration
Defined 71
Charging
Battery 11
Clear data 33, 34
Combining Noise sources
Defined 69
Communicating
Edge Dock 11
Crest Factor
Defined 69
Criterion Level (CL)
Defined 69
Criterion Time
Defined 70

D

Date
Setting 34
Decibel (dB)
Defined 70
Docking station 23
Components 12
Dose
Defined 70
Dose % indicator LED 25
Dose % Indicator LED 9
Dosimeter 1 & 2
Setting 27
Doubling Rate
Defined 70
Download 23
Downloaded node 48

E

Edge
Positioning 38
Edge Dock
New hardware wizard 24
EdgeDock1 47
EdgeDock1 and EdgeDock5 23
eg3 6
Memory storage 22
eg4 6
Memory storage 22
eg4 model 62
Exchange Rate
Defined 70
Export data 23

F

Fast or slow response
Setting 25
Free field setting (microphone)
Defined 71

G

Get Identity 32

H

Hearing Conservation
Defined 71
Heartbeat 55
Heartbeat enable/disable 25
Hertz
Defined 71

I

Identity setting 31
Import 49

L

Lavg
Defined 71
LED indicator
Flashing amber light 9
Flashing green light 9
setting in QSP-II 9
Lep,d
Defined 71
Leq
Defined 72
Lmin
Defined 72
Load your studies 47
Loading your studies 47
Locking 46
About 45
Setting 30
Logging 62
Defined 72

M

Maximum Level
Defined 72
Measurement Range
Defined 72
Memory storage symbol 22
Model
eg3 6
eg4 6
Mount the docking station 15

N

Naming setup 26
Naming your dosimeter 31
Noise Floor
Defined 72

O

Options menu 41, 42
Overload 44

P

Peak Level
Defined 72
Peak weighting
Setting 25
PEL
Defined 73
Power
Turn off 9
Turn on 8
Projected Time
Defined 73

Q

QSP-II
Heartbeat enable/disable 25
Heartbeat enabled 55
Meter Config 51
Noise Study 51
Organizer Node 51
Session Report 51
Threshold enabled 25
Threshold enabled 55

R

Random incidence (microphone)
Defined 73
Reset 41
Reset the meter 42
Resetting in QSP-II 33, 34
Response Time
Defined 73
Retrieve data 23, 47
RMS
Defined 73
RMS weighting
Setting 25
Run indicator 43
Run mode 44
Running a study
Overview 37
Running studies
Steps 43

S

Securing
Setting 30
Securing run mode 46
SEL

Defined 73
Set Identity 32
Settings
Named Setup 26
Sound pressure 3
Splash screen 8
Standards 3
Status update message 26
Stop a noise study 44
Stop mode 44
Storing files 49
Studies
Viewing in QSP-II 50
Symbol
Battery power clock 22
Calendar 22
Memory storage 22

T

Threshold
Defined 74
Enable/disable 26
Threshold enabled 55
Time
Setting 34, 35
TWA
Defined 74

U

Unlock mode 46
Unlocking 46
Upper Limit (UL) 75
USB cable 23, 47

V

Views 20

W

Weighting (A, C, Z, etc.)
Defined 75
Windscreen
Defined 75

Quest Technologies, a 3M company, is a world class manufacturer and leader in the field of occupational safety, industrial hygiene and environmental instrumentation. Quest products are used in more than 80 countries worldwide. Quest has a strong reputation of rugged, reliable instrumentation and software systems that monitor and evaluate occupational and environmental health and safety hazards including noise, vibration, heat stress, indoor air quality and toxic/combustible gases.

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